Institute of Hydrology

MINISTRY OF LANDS
AGRICULTURE AND
WATER DEVELOPMENT
ZIMBABWE

British Geological Survey

OVERSEAS DEVELOPMENT ADMINISTRATION

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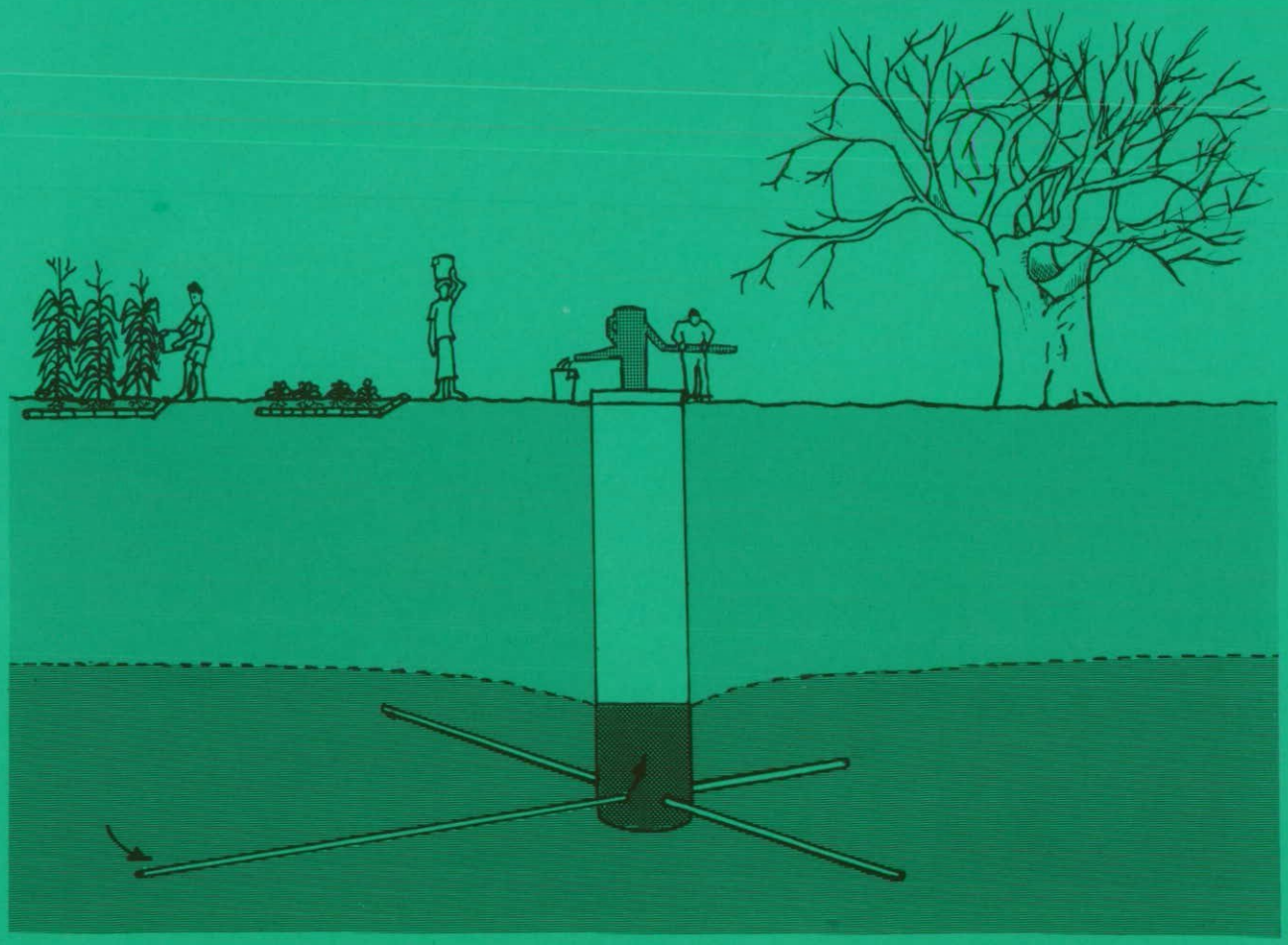

SMALL SCALE IRRIGATION USING COLLECTOR WELLS PILOT PROJECT - ZIMBABWE

FOURTH PROGRESS REPORT
April 1994 - September 1994

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IH Report ODA 94/9

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Summary

The ODA TC pilot project "Small scale irrigation using collector wells - Zimbabwe" began in October 1992. This report outlines progress made on all aspects during the fourth six months of work.

The six project schemes are now complete. Two additional schemes for Plan International (NGO) are also near to completion. As planned, these schemes represent a range of physical, social, economic and institutional settings. The number of families obtaining domestic water from ODA-funded schemes is 1319 and the number of families with allotments on the community gardens is approximately 577.

Individual socio-economic baseline surveys have been carried out for the six project communities and now provide data on social, institutional, economic and agricultural aspects of rural life before scheme installation. This information is being used in monitoring and evaluating the impacts of the schemes on the communities and in drawing up guidelines for the design and implementation of future schemes. Shortage of water is the principal problem reported by respondents at all sites. At some, the priority is for a cleaner and more reliable source of domestic water. At others, the priority is for water to allow vegetables to be grown for home consumption and for sale.

Monitoring of garden performance is proceeding well. The first scheme completed in Chivi District in 1991 continues to produce high returns, recording an average gross margin of Z$19,900 per ha per year for three years of operation. First gross margins recorded at pilot project schemes are similarly high, being Z$18,204 and Z$25,444 at Muzondidya and Gokota respectively. The figure for Gokota actually represents less than one complete year and is an indication of the excellent returns possible from small areas intensively cultivated if water can be made available in these dry areas. Social and institutional "teething" problems were encountered at most of the earlier schemes. However, production figures indicate that these have been overcome. Valuable lessons have also been learnt by project staff that led to significant improvements in implementation of the later schemes.

Good progress has been made on the comparison of well design at each scheme location. Total water use from the collector wells is typically 15-20 cubic metres per day. Improvement to yield by radial drilling has been very good at four of the five sites drilled to date, and both pump tests and well performance suggest that the wells at Dekeza, Nemauka and Mawadze could in fact now support a garden larger than 0.5ha if required. First results comparing performance of the collector wells with other well types at each scheme location indicate that single high yielding boreholes may be technically viable in some areas. However, real comparison can only be made when pump tests are completed during a period of drought. Economic viability of siting high yielding boreholes to support community gardens is also shown to depend very much on the success rate of drilling.

Excellent progress has been made to distil experiences and knowledge gained during this pilot phase and to draft guidelines to assist future development of community gardens using groundwater. A decision tree is being developed that shows key steps now known to be important to achieve successful collaboration with communities and to help ensure implementation of schemes more likely to be sustainable from a social point of view. This also includes the key steps required to determine the most cost-effective well design to support a community garden in any area.

Indicative values of agroeconomic performance of different types of irrigation system operating in Southern Zimbabwe highlight the important role that community gardens using groundwater can play, addressing in particular the primary needs of improved health and poverty alleviation in poor rural communities in dry areas. Indeed, much interest is being expressed by various organisations in the region wishing to develop these type of schemes. It is timely, therefore, for discussion amongst senior GoZ staff and ODA to determine how best to proceed from this pilot phase and to develop groundwater based community gardens on a wider scale.

Contents

1 Introduction

The pilot project "Small scale irrigation using collector wells -Zimbabwe" contains the following main elements:

i) selection of suitable sites and the installation of six small irrigation schemes using water from collector wells in south-east Zimbabwe;

ii) the assembly and collection of adequate baseline data and design of a monitoring system to facilitate the assessment required at iv below;

iii) the regular collection of data through the monitoring system;

iv) production of a final integrated report on the scheme's technical, economic, financial, institutional, social and environmental viability, with recommendations for future development.

The main objectives of the project are:

i) to field test the validity of small scale irrigation and collector well research results obtained at the Lowveld Research Stations (LVRS);

ii) to identify ways of improving the operation of the schemes, for example by identifying and overcoming constraints;

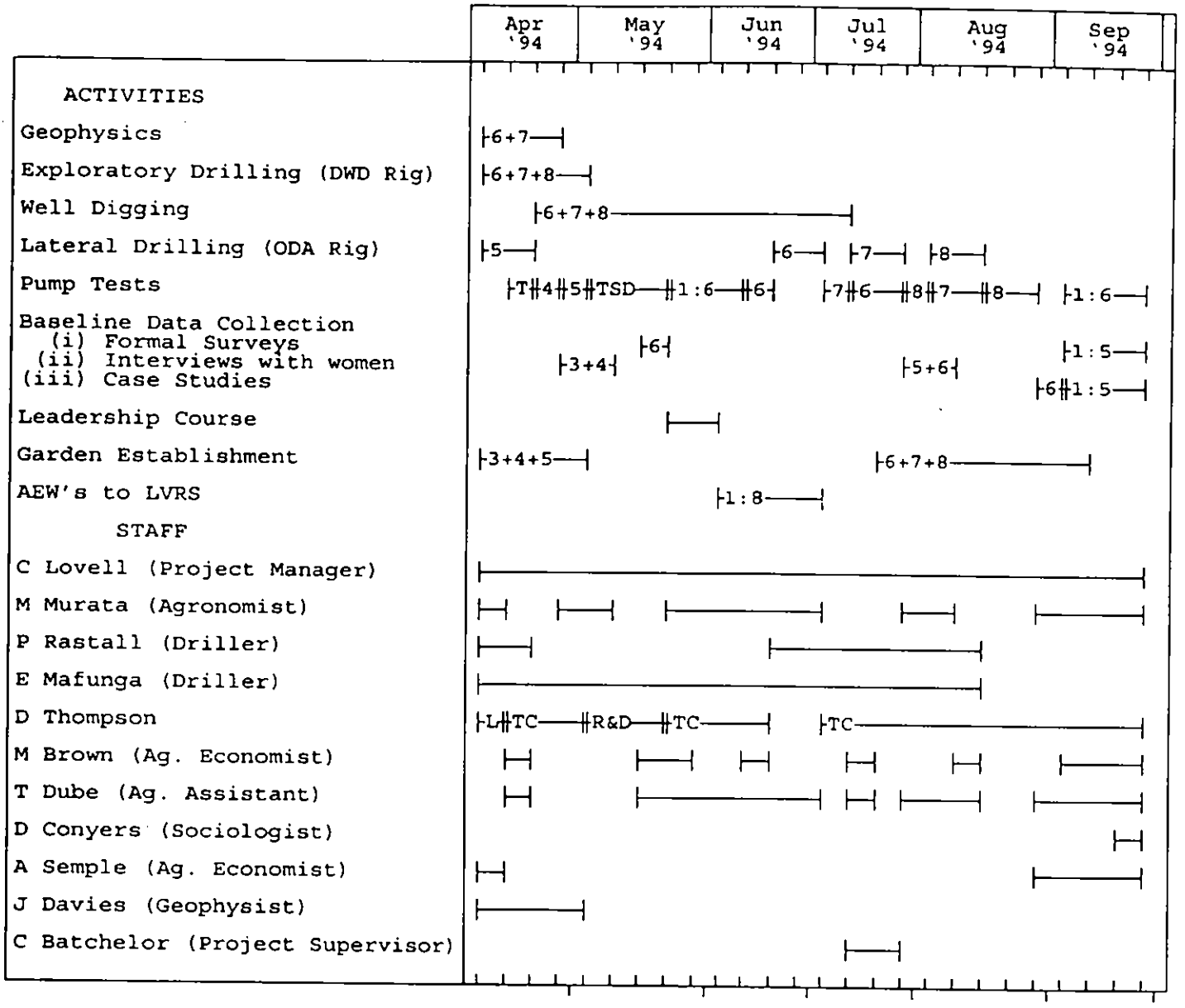
iii) to identify a basis for replicating the schemes on a wider scale.

(Ref. Project Data Sheet, BDDSA March 1992)

The project started on the 1st October 1992. This report outlines progress made during the fourth six months of work, subsequent to that described in the third progress report published in October 1993.

2 Work completed during fourth six months

A provisional programme of work for the fourth six months proposed at the time of the third progress report was:



In the event, good progress has been made to complete the fifth site and to identify and construct the sixth plus two additional sites for Plan International. Collection and analysis of socio-economic baseline data is complete at all six sites and good progress is being made to monitor garden and well performance and to compare well designs at each. A leadership course was held for members of each scheme, and a field day held at LVRS to introduce alternative garden irrigation methods to staff of Agritex.

2.1 SITE SELECTION

To provide reliable hydrogeological evaluation, site selection during this pilot phase has attempted to consider each geology and corresponding terrain type found in the project area and region as a whole, namely younger mobile belt gneiss, older gneiss complex, younger intrusive granite, Karoo basalt and Beitbridge paragneiss. Figure 1 shows that the nine sites to date have been successfully located on three of the five geologies. Despite considerable effort, sites could not be located on older gneiss complex either because water tables were

found in the hard rock or were very deep in highly weathered rock. Sites could be found on Beitbridge paragneiss but were not located principally for fear of the saline water found to be prevalent.

2.1.1 Exploratory Drilling at Muredzi (older gneiss complex)

Three holes to hard rock were drilled in the area of Muredzi kraal (Map 2031 A4; 400 430) between 13/4/94 and 15/4/94. In common with previous attempts to site a scheme on this geology (Third Progress Report), all holes were either dry or had very little water resting on top of the hard rock. No further attempts to site a scheme on older gneiss complex were made.

2.1.2 Exploratory Drilling at Matedze (younger gneiss)

During construction of scheme #3 at Dekeza School, leaders of a community at Matedze (Map 2031 C2; 306 205) 7km away approached project staff to report a serious shortage of water in their own area and to express interest in the type of project under way at Dekeza. During the following months project staff visited the area and decided that it held potential (again younger mobile belt gneiss and apparently suited to collector wells). Only two exploratory holes were required on 21/4/94 to confirm site suitability, rest water level being 5 metres in 11 metres of weathering. Full details of this the sixth site are given in Appendix 1.

2.2 WELL CONSTRUCTION

2.2.1 Well Construction at Mawadze (#5)

As reported in the Third Progress Report, well construction at Mawadze proceeded at a record pace following introduction of an informal 'contract' between project staff and community. Digging began in mid-December and was completed to 15 metres in only 45 working days. As agreed, all work was performed by the community on a voluntary basis, teams of five men working for five days each under supervision of a project foreman. Spirits remained high throughout and each team worked hard and without problem.

Four radials were subsequently drilled between 6-9 April. Improvement to yield was good as indicated by pump test results shown later (Section 2.3.2).

2.2.2 Well Construction at Matedze (#6)

As at Mawadze, two meetings were held with the community of Matedze to discuss the potential collector well garden project. The first meeting on 22 April was attended by over 70 members of the community plus local leaders, and basic information about present water sources, community structure and community interest was established (Appendix 1). At the second meeting on 27 April seven leaders attended to represent the five kraals to be in the project. The informal contract was again introduced and signed.

Digging began at the beginning of May and was completed to 11 metres by the end of July. Again, all work was performed by the community on a voluntary basis, teams of five men working for five days each under supervision of a project foreman, working hard and without problem. Radial drilling to complete this well is under way at present.

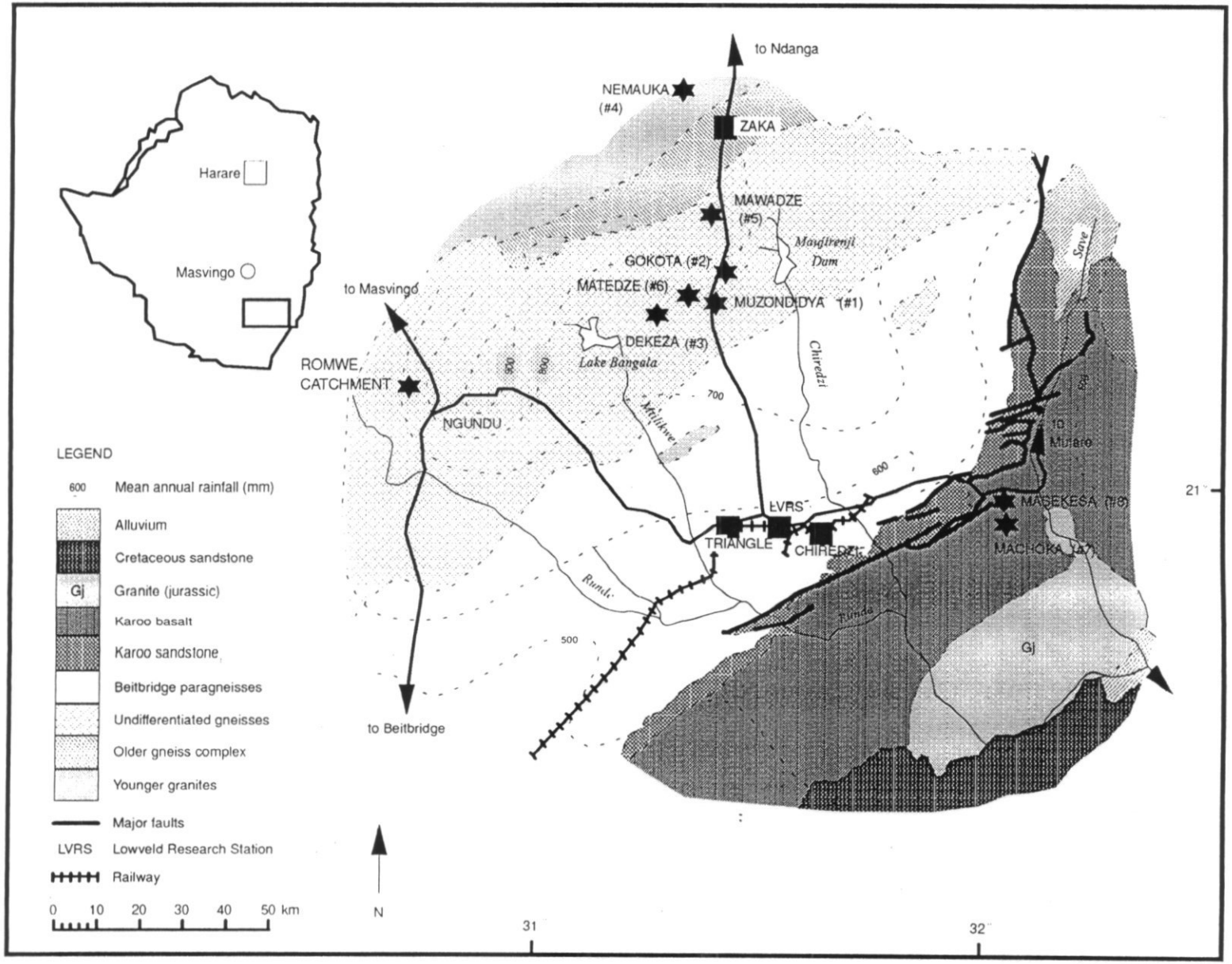


Figure 1. Regional Geology and Location of Schemes

2.2.3 Water quality

Table 1 shows results of baseline water quality analyses performed for each collector well garden constructed to date.

Irrigation problems due to salinity (high electrical conductivity) affecting water availability to the crop are unlikely to occur except at Machoka and Masekesa (sited on basalt) where the potential problem may be classified as 'slight to moderate' (FAO, 1985). Problems of high SAR and low electrical conductivity adversely affecting infiltration rate and soil structure are unlikely to occur at these two sites but may occur at all other sites where the potential problem may again be classified as 'slight to moderate'. Specific ion toxicity is unlikely to occur at any site. However, high levels of bicarbonate (HCO_3) measured at Machoka and Masekesa make this water unsuitable for overhead sprinkler irrigation. Nitrate (NO_3-N) is also high at these two sites, approximately twice the WHO guideline value of 10 mg/l. It may be that the basalts are more vulnerable to pollution by ingress of surface contaminants in fissures. The more clay-rich weathered mantle over crystalline granites and gneisses may be rather a good protection against surface pollution. Direct contamination of water during construction is indicated by the high levels of faecal *E.coli* measured at the two sites recently completed, Mawadze and Matedze. Further samples will now be taken at all sites during the coming wet season, both from collector well and nearest borehole or dug well, to determine if the problem is specific to the well or aquifer and whether the problem diminishes once pumps are fitted and the wells settle down.

2.3 COMPARISON OF WELL DESIGN BY PUMP TEST

2.3.1 Well performance to date

Figure 2 shows performance to date of the first five operational wells. The top section of each graph shows the weekly maximum and minimum water level, the bottom section indicates the weekly water use. This monitoring shows that the water required to irrigate a 0.5 ha garden and satisfy the local domestic need is approximately 15 m3/day. All the wells constructed to date yield at least this volume. As indicated by Figure 2 the wells at sites #3,#4 and #5 actually could sustain higher abstraction. Monitoring will continue in order to assess the performance of the wells during periods of prolonged use and during periods of low rainfall.

2.3.2 Improvement of yield by lateral drilling

Lateral drilling has enhanced well yields significantly at four of the first five wells completed to date. As shown in Figure 3, lateral drilling has the effect of reducing drawdown and increasing rate of recovery following a fixed rate pump test. In real terms, the effect of these improvements has been to increase the relatively low yield of the large diameter well at site #1 to significantly above the required target of 15m3/day. At site #2 the yield was increased slightly to just in excess of 15m3/day. At sites #3, #4 and #5, good large diameter wells were improved to become high yielding collector wells that now far exceed the required target of 15m3/day. First results from tests recently performed at site #6 suggest that the laterals there have significantly improved a relatively poor large diameter well and the collector well should now yield the required target of 15m3/day.

Table 1 *Baseline water quality anlyses for each collector well*

	Date	pH	EC ms/cm	Na	K	Ca	Mg	HCO_3	SO_4	Cl	NO_3-N	Si	P-Tot	B	FE_{Tot}	F	SAR meq/l	RSC meq/l	Faecal e.coli/10 5ml
Guidelines:																			
Human Cons				400					400		10.0				1.0	2			<2.5
Irrigation		8.50	0.70	900	2.0	400	60	600	900	500	10.0		2.0	2.00	20.0	15	15.00	<2.5	
LVRS C.Well	3/6/89	8.08	0.99	79	0.7	73	59	651	26	33	4.8	27.5	<0.5	0.14	0.02	0.9	1.66	2.1	-
	1/7/93	8.08	0.99	91	<0.5	88	85	599	25	152	8.4	31.3	<0.5	0.14	<0.02	0.9	1.65	-1.7	-
TSD C.Well	25/4/91	7.73	0.35	32	<0.5	26	19	253	9	42	1.1	37.7	<0.5	0.03	<0.02	0.3	1.14	1.2	-
	1/7/93	7.74	0.35	31	<0.5	25	18	202	4	19	3.7	38.0	<0.5	0.03	<0.02	0.3	1.13	0.5	-
Muzondidya	16/3/93	8.14	0.37	21	1.4	45	21	273	1	11	<0.4	26.8	<0.5	0.03	0.06	0.3	0.66	0.5	1.0
Gokota	1/4/93	8.19	0.29	23	1.6	32	12	203	2	9	<0.4	35.7	<0.5	0.03	<0.02	0.2	0.86	0.7	0.0
Dekeza	2/8/93	7.41	0.35	15	<0.5	22	18	175	1	13	<0.4	38.2	<0.5	0.3	0.37	0.6	0.56	0.3	5.0
Nemauka	17/6/93	8.06	0.44	54	2.3	37	13	301	1	16	0.9	30.4	<0.5	0.03	0.10	0.9	1.96	2.1	3.0
Mawadze	10/12/93	8.47	0.69	114	<0.5	27	12	320	1	61	<0.3	29.4	<0.5	0.03	<0.02	0.6	4.59	2.9	25.0
Matedze	2/5/94	8.34	0.42	18	0.8	25	29	211	25	10	<0.3	34.5	<0.5	0.03	<0.02	0.3	0.56	-0.2	50.0
Machoka	6/5/94	8.56	1.11	66	<0.5	9	106	455	8	89	23.1	36.9	<0.5	0.10	<0.02	0.4	1.33	-1.8	-
Maseksa	5/5/94	8.61	1.22	57	0.7	48	113	585	4	58	25.8	37.7	<0.5	0.07	<0.02	0.9	1.01	-2.2	-

All units are mg/l unless otherwise shown

SAR = sodium adsorption ratio - $Na^{+} / ((CA^{2+} + Mg^{2+}) / 2)^{0.5}$

RSC = residual sodium carbonate - $(CO_3^{2-} + HCO_3^{-}) - (Ca^{2+} + Mg^{2+})$

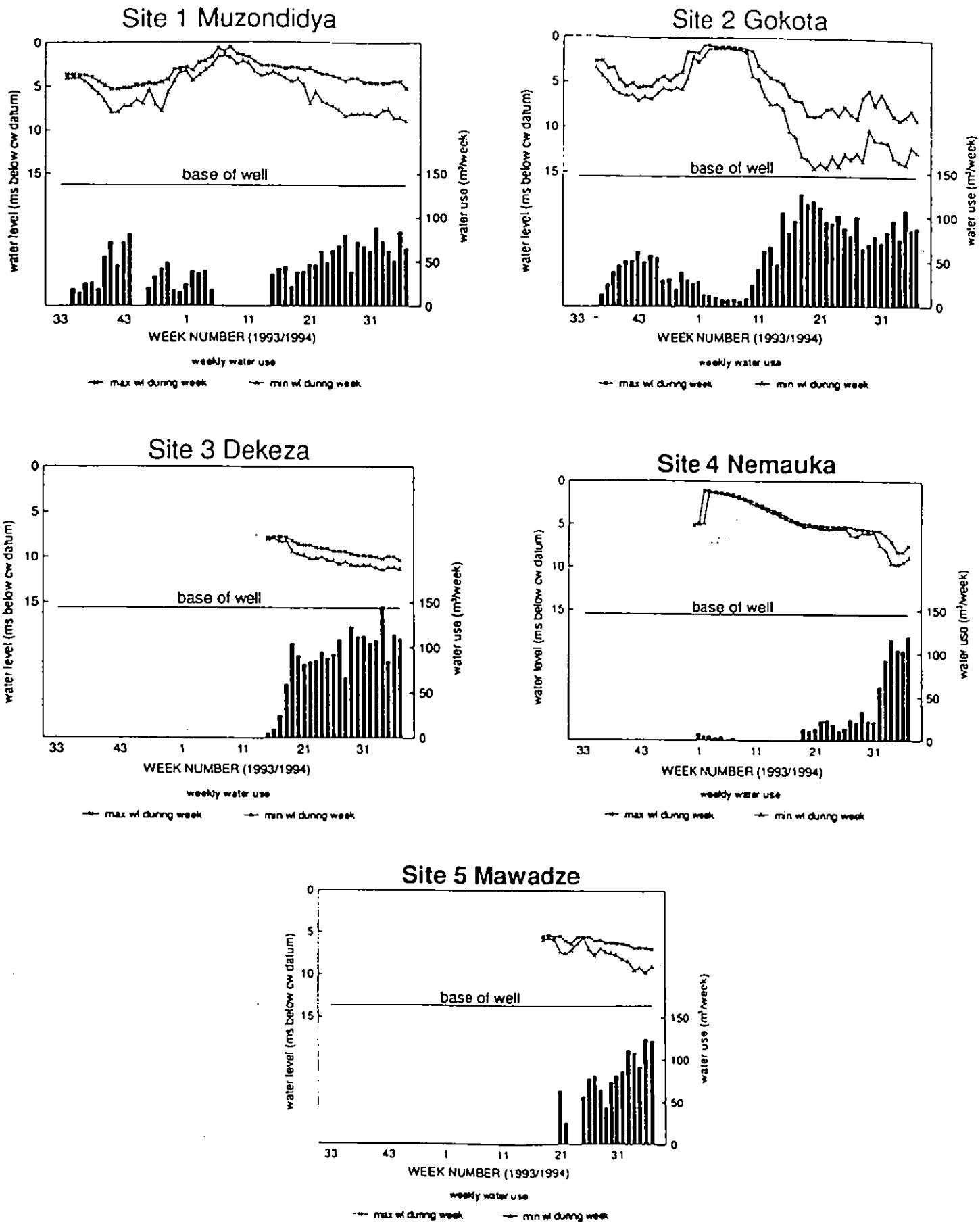


Figure 2 *Collector well performance to date*

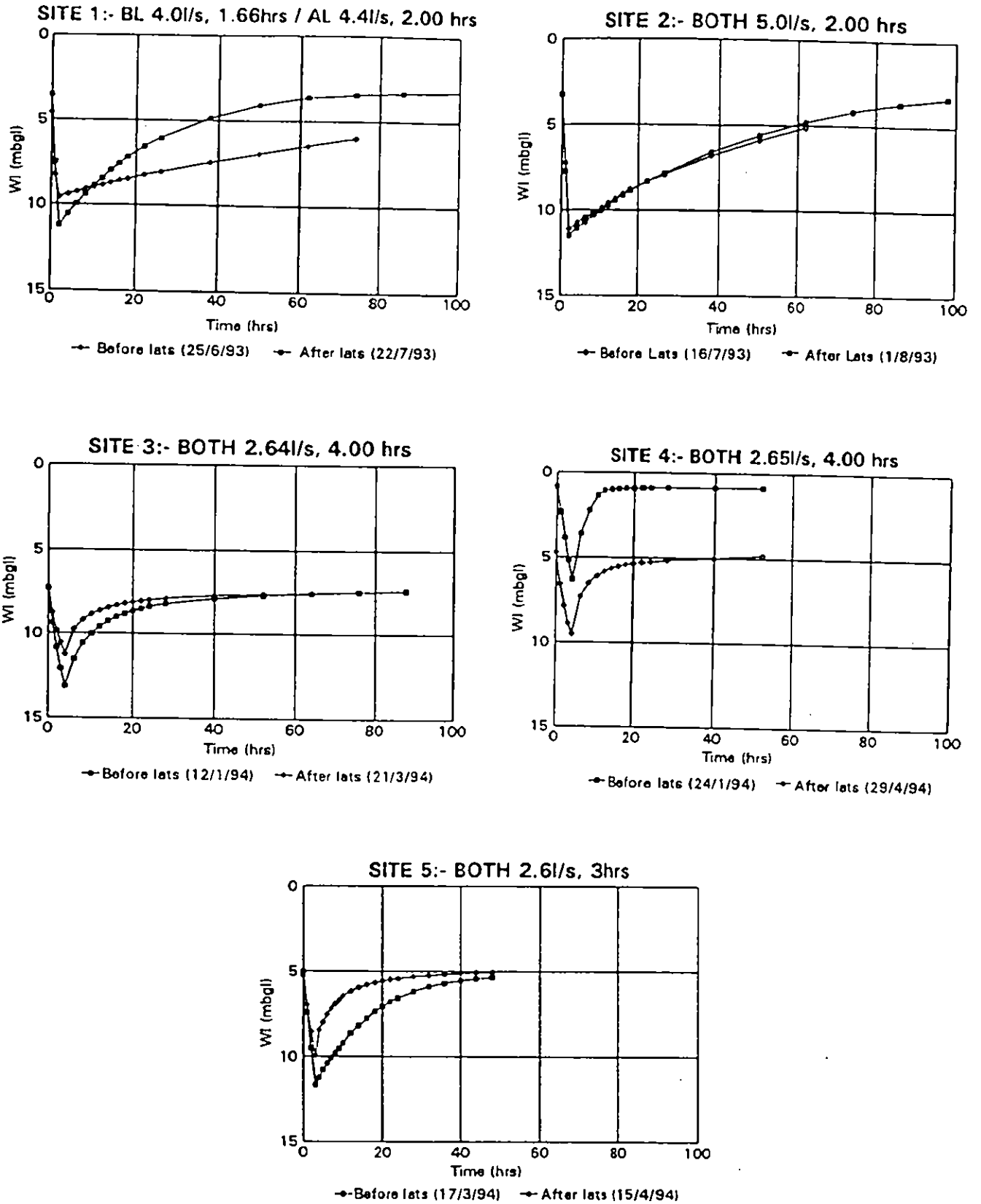


Figure 3 *Effect of lateral drilling*

Aquifer and well properties calculated from the above pump tests and similar pump tests performed on nearby boreholes and traditional wells are currently being used to simulate the long term performance of the different well types. Results of these tests and simulations will be presented fully in the next progress report, and will enable staff in future to determine the most appropriate and cost effective well type for any area following the decision tree presented later in Section 5.2.2.

2.4 COLLECTION OF BASELINE SOCIOECONOMIC DATA

2.4.1 Formal household surveys at Matedze (#6)

Formal household surveys have been completed at the sixth scheme Matedze. A report written by MW Brown and T Dube is given in Appendix 2. Features of particular interest to emerge from this study include:

- A severe shortage of water at this site both for drinking and gardening. Vegetables are particularly scarce during the winter months of May to October when 100% of households reported consuming vegetables dried during the summer;

- Gardening has been practised by 97% of households but only 7% still have small gardens today due to water shortage;

- Average annual grain production from rainfed crops is relatively low at 1 740 kg per household and is sufficient for less than two years consumption by an average family;

- Relatively low levels of livestock ownership and production of rainfed crops suggest a lower standard of living in this area. The poorest 40% of households account for only 16% of total incomes earned from rainfed cropping and average just $626 per household per year.

- Experience of previous development projects is low. All respondents were aware of the scheme and are eagerly awaiting inception with high expectations. 93% of respondents expressed a willingness to join the community garden with only old age and distance (6km) deterring the remaining 7%.

2.4.2 Compilation of formal household surveys

Individual baseline surveys have now supplied data on social, institutional, economic and agricultural aspects of rural life at each of the six locations before scheme installation. This information can be used in monitoring and evaluating the impacts of the schemes on the communities concerned and in drawing up guidelines for the design and implementation of future schemes.

The six baseline reports have been combined into a single summary report (Appendix 3). This report, written by MW Brown and T Dube and entitled "Farms and households in six communities of Zaka District, Zimbabwe, prior to the installation of collector wells and community gardens 1993-94" brings together the findings of the six surveys and highlights a number of parameters which vary between the sites and which should be taken into account when comparing the performances of the different schemes. For example:

- Shortage of water is the principal problem reported by respondents at all sites. At some the priority is for a cleaner and more reliable source of domestic water. At others, the priority is for water to allow vegetables to be grown both for home consumption and for sale;

- The number of households within reach of the collector wells vary from 117 at Mawadze up to 263 at Gokota. The number of families with allotments on the community gardens varies from 49 at Dekeza up to 134 at Muzondidya;

- The availability of labour will depend on the numbers of male family members who are absent, which varies from 35% at Muzondidya up to 57% at Gokota, and also upon the extent to which hired labour is used;

- There are differences in wealth between and within sites. Mawadze appears to be the wealthiest and, together with Nemauka, has the most equal distribution of incomes and of land.

- At all sites there is a tradition of gardening and a demand for vegetables upon which the collector wells and community gardens are aiming to build. Women supply most of the labour for all existing gardens and for management where they are privately owned. However women tend to be less involved in management of existing community gardens where men and the Agricultural Extension Worker assume the major roles. The net effects of the new schemes on women will depend on the balance between extra work which the schemes demand of women, the distribution of the benefits, and any opportunity cost in terms of other activities which may need to be compromised such as rainfed cropping or off-farm activities.

- The institutions and local leaders who people regard as influential vary between sites and, in some cases, within the same community. At each future scheme these will need to be identified.

- Experience of existing community and private gardens and gaps in peoples' knowledge suggest that priorities for extension will include pest and disease control, pump repair and maintenance, the need to raise money to purchase inputs, and water saving methods of irrigation.

2.4.3 Case study households

Detailed case studies of four families at Muzondidya, Gokota, Dekeza, Nemauka and Mawadze have been completed as part of baseline socio-economic data collection. A separate report (ODA Report 94/1) written by AJ Semple, M Murata and T Dube is available either from the Lowveld Research Stations, Zimbabwe or Institute of Hydrology, UK.

Although lengthy, these detailed case studies give one a 'feel' for rural life before scheme implementation. A return survey is now planned for the latter half of 1995 in order to assess the impact of the schemes upon these families.

In the meantime, the intention is to maintain regular contact with the communities at each scheme in order to gain a general picture of the local dynamics of project implementation. This will include more information on the subject of 'community institutions', be they either

extended family linkages which are an important source of material support for the family or contacts with people or institutions of influence which affect the family's access to resources. In particular, information will be collected to determine which families eventually became members of the community garden and which did not, and how both members and non-members perceive the project and benefit from it.

2.4.4 Meetings with groups of women

Meetings with groups of women have now been held at each of the six schemes. The meetings revealed a number of aspects related to gender, decision making, division of labour, vegetable consumption and health that are likely to be important factors influencing success of the schemes. A report written by M. Murata that brings together the findings of these individual meetings is given in Appendix 4. Some features of particular interest include:

- The significant workload faced by women. Almost all day to day tasks like fetching of water and firewood, child care, cooking, cleaning, shopping and even watering and tending animals are now done primarily by women. Those with daughters share some of these chores, those without have to cope on their own.

- The health of children and adults is generally not considered satisfactory because diets are poor, the main reasons stated being lack of grain legumes like beans, cowpeas and groundnuts to provide proteins, coupled with the unaffordability of the basic complements necessary for vegetable preparation.

- Services received from health clinics were generally said by the women to be satisfactory. However, there is a constant shortage of some drugs and, importantly, the price of family planning tablets has gone up and the majority reported that they cannot now afford them.

- Village Community Workers (VCW's) in all areas except one were said to be doing a great job. Their duties include teaching women basic hygiene, child care, food preparation and family planning methods, encouraging pregnant women to visit clinics for checkups, and encouraging income-generating ventures. The principle problems faced by the VCW's are two: lack of transport and lack of materials. Bicycles were promised by Ministry of National Affairs but have not yet arrived. Body building foods such as bambarra nuts, peanuts and cowpeas although advocated by VCW's are in practice very often not available.

- The role of gardener falls to the women since they are traditionally seen to be responsible for providing relish. At all sites the collector well gardens are considered by the women to be a blessing. They are valued as a source of clean drinking water and reliable source of vegetable production. At some sites they are also seen as an opportunity for a new start (after the drought) with income generated from them to be used as capital to start other projects.

2.4.5 Meetings with groups of men

Similar meetings with groups of men only have been held at two sites Mawadze and Nemauka. A report written by T.Dube and G.Mtetwa is given in Appendix 5.

2.4.6 Training for Transformation

As reported in the Third Progress Report, two project staff of DR&SS, Ms Murata and Mr Dube, and three project staff of Agritex, Mr Makunde (AEW Muzondidya), Mr Magonde (AEW Mawadze) and Mr Takaindisa (Supervisor), attended part one of a Training for Transformation Course held at Silveira House designed to teach and encourage development of self-reliant creative communities. During the past six months, these staff have now attended the second and final part of the course at Silveira House and have organised a leadership workshop for committee members of each collector well garden. The following reports were written by Ms Murata and Mr Dube respectively:

Training for Transformation Course: Phase II

The course was held from 13 to 17 June, 1994 at Silveira House. It focused on project planning, implementation, monitoring and evaluation, the objective being to train people to be good project managers. Phase II was thus not ideal for project staff but would be suited for project participants. In future it would be worthwhile to send project committee members to attend this course as this would help them a great deal in the running of their project.

Training for Transformation Course: Leadership Workshop

Forty committee members from the six collector well gardens attended a leadership workshop on 13 May, 1994. The course was held at Mushungwa Community Hall in Zaka District under the direction of Mr Takaindisa. The aims of the workshop were:

a) To help members identify their own problems and possible solutions;
b) Leadership strengthening within the groups;
c) Discuss operation of committees and relationships with communities;
d) Promote good garden management.

Four principle topics were presented by the facilitators:

a) Problem posing and codes (M Murata and T Dube)
b) Leadership qualities (E Takaindisa)
c) Safe use of pesticides (A Magonde and J Tabeni, DR&SS)
d) Garden cropping patterns (S Makunde)

The active participation of all persons present was encouraged by use of various practical exercises, and frank discussions were held about leadership qualities and real-life problems that have been experienced. The majority of members expressed the wish that this workshop had been held before their schemes had started, although leaders of the sixth site Matedze were happy that they could now start their community garden project having a better picture of what makes a good leader and the importance of unity. Feedback since the workshop has been positive. The suggestion at all sites is that members who attended the course have since been able to improve upon wrangles that existed and without further help from the AEW's. It appears also that those who attended the workshop have relayed information about it on to other members. At Muzondidya, for example, a lady who attended the workshop in her capacity as Vice Secretary has since been elected as the new Chairperson. Upon her appointment, she called for a community meeting where she outlined to the members the importance of unity and good leadership and the role to be played by everybody to achieve this.

2.5 MONITORING OF COMMUNITY GARDENS

The following table shows the gross value of vegetable output recorded at each scheme during the recent winter season up to September:

Site	Date of first planting	Gross values (Z$) Home consumed	Sold	Total	No of members
Muzondidya	March	833	455	1288	134
Gokota	March	7975	4747	12722	112
Dekeza	April	3600	3274	6874	49
Nemauka	August	0	0	0	84
Mawadze	June	537	308	845	50
Matedeze	Garden still under construction				

2.5.1 Muzondidya

This garden continues to lack effective leadership since the current chairman has not been active since being accused of financial malpractice. Members are reluctant to formally discharge him due, it is said, to a fear that once this is done then the chances of him reimbursing them will be slim. Despite this, the vegetables are still well looked after, which suggests that the relatively low figures for output may include some under-reporting possibly due to the lack of leadership. The Agricultural Extension Worker however, seems to be playing a particularly active role at this site.

2.5.2 Gokota

Progress continues to be excellent at this site and is reflected in the high output figures achieved. It is characterised by a large membership which is united under a dynamic and well educated leader, although the Extension Worker is said to be less active.

2.5.3 Dekeza

This site is also progressing well. Like Gokota, it has a strong leader who is very much "in charge" but a smaller number of members. The initial dispute with the neighbouring school appears to have been settled to the extent that the well is now supplying water to the school garden and for brick moulding.

2.5.4 Nemauka

Development at this site continues to be slow due to a dispute between members as to who should be in the management committee. The "old" committee which comprised entirely women was replaced since they had been unable to get the garden started, due it was said, to difficulties faced by women when dealing with local authorities such as the DDF who had been expected to plough the garden. A "new" committee of mainly men was appointed. This succeeded in getting the garden planted out but faced hostility since it was said to be dominated by businessmen who had admitted new members without reference to the existing membership. At the time of writing it is understood that the members have decided to re-elect

the "old" committee but as yet the "new" committee has been reluctant to hand over the books and funds. As a result, production has not yet commenced. A meeting was held with the "new" committee to explain the procedures for record keeping but this will need to be repeated if the "old" committee is reinstated.

2.5.5 Mawadze

Progress at this site has been rapid considering that it was the last to be completed and has only been in operation since June. The members are well organised under a seemingly competent but not overpowering chairman and, unlike the other sites, there have been no internal disputes yet to delay progress. Mawadze is the only scheme to have opened a bank account.

2.5.6 Matedze

At the time of writing, the collector well at this site has just been completed and a pump maintenance training day for eight members of the community conducted. The garden fence is up and planting is expected soon.

2.5.7 Tamwa, Sihambe and Dhobani

The community garden at this the first scheme implemented in 1991 is going through a period of dislocation due to a combination of factors. Establishment of crops in the early part of the season was hampered by rodents and latterly frost caused the abandonment of tomatoes. A series of breakdowns to the pumps were not attended to immediately due to the absence of men (attracted by the offers of paid employment) who had been trained to repair and maintain them. The suggestion was made that women should be identified and trained since they are less likely to go away; the idea was agreed to in principle. A further factor has been that the garden chairman appears to be less active due to illness and his commitments to a small dam project. Record keeping has also suffered since the previous secretary migrated to work in Triangle and has only recently handed over the books to his successor. Nevertheless, the rank and file members continue to show a commitment to the garden. Most beds are well weeded and by the end of July a total of Z$1 400 worth of rape leaves had been produced since the season began in May.

2.6 INTRODUCTION OF ALTERNATIVE IRRIGATION METHODS

2.6.1 LVRS Open Day

An open day for Agritex staff involved in the project was held on 25 July 1994 at Chiredzi Research Station. There were thirteen participants including the DAEO's of Zaka and Chiredzi Districts. The day started with a brief welcome to the participants by Dr Lovell at 9.45 am. The participants were then introduced by Ms Murata to other LVRS personnel from the Horticulture and Crop Protection Sections invited to participate in the open day. The programme for the day was as follows:-

a) Horticulture
   - Nursery techniques
   - Principles of vegetable production

b) Water-saving irrigation techniques
   - Subsurface clay pipes
   - Porous clay pots
   - Flood under mulch

c) Demonstration of clay pipe making

d) Pest control in gardens

The following observations regarding the activities of the day were made:

- There was great interest in the nursery practices, especially propagation of fruit trees for the gardens. Arrangements were made with the Horticulturist to conduct a training course on propagation for the scheme members, details to be arranged by DAEO's and Horticulture Section.

- Principles of vegetable production generated a lot of interest and lively discussions on plant spacings and varieties ensued. It became clear that in practice the choice of crops available to the farmers depends primarily on the limited seed availability on the local markets.

- The participants were impressed with the potential of the alternative irrigation methods but would not commit themselves to say which method they thought had the greatest potential in their areas. However, they expressed a willingness to demonstrate these alternative methods of irrigation in the collector well gardens. Furthermore, they suggested that arrangements should be made to bring some of the garden members to the Research Station to learn how to make pipes. It was suggested that this could be done on the same day that other members came for training on grafting. DAEO's to liaise with LVRS staff. All agreed that pipe making was an easy task which the people could learn in a day. Some tried it themselves and found it easy.

- Pest control in gardens was thoroughly discussed and questions about natural methods of control were raised. LVRS staff did not have sufficient information and are to refer to work done at Plant Protection Research Institute.

In a vote of thanks by Agritex at the end of the day, it was stated that the day had been an eye opener for the participants. They promised that they would demonstrate new ideas in the collector well gardens where possible and agreed that some members of the schemes should come to the Research Station for training in grafting of fruit trees and manufacture of clay pipes. The DAEO's confirmed that now knowing about the alternative irrigation methods they will monitor progress of extension in the collector well gardens.

List of Participants:

Mr G Mamhare, DAEO Chiredzi
Mr S Mugari, Chiredzi
Mr K Chauke, Chiredzi
Mr F Jogarepi, Chiredzi
Mr A Mahlekete, Chivi
Mr S Manhivi, DAEO Zaka
Mr E takaindisa, Zaka
Mr T Maireva, Zaka
Mr C Chamunorva, Zaka

3 Additional schemes for Plan International

3.1 OBJECTIVES

Three main objectives were addressed during the project to construct two additional schemes for Plan International:

i) to introduce the concept of community gardens using groundwater to an NGO and thereby allow two schemes to be implemented in a different way by a different organisation involved in community development;

ii) to test collector well performance on a different geology namely basalt;

iii) to increase participation of GoZ staff in scheme construction.

3.2 PROGRESS

At the time of writing, both wells are nearing completion. The following is a brief diary of events that shows how this has been achieved:

Feb 94 DWD counterpart conducts reconnaissance of boreholes in Sangwe to assess rest water level;potential areas based only on shallow rest water level are listed. Plan asked to put the list in their order of priority based on their criteria. Revised list received.

Mar 94 Arrangements made for DWD drilling rig and crew. Plan to liaise with priority communities about arrival of drilling equipment.

Apr 94 DWD drilling rig (Bournedrill THD25 and XR210 Compressor) and crew arrive in Sangwe to perform exploratory drilling. Successful: four days drilling in three priority areas (seven holes) identified three sites for collector wells, one for a borehole, one unsuitable. Water sampled at all found to be saline to some degree. Management to avoid build up of salts in soils of associated gardens will be necessary in this area.

May 94 Digging commenced at two sites Machoka and Masekesa chosen by Plan to serve Primary School and community respectively. DWD counterpart appointed as site foreman responsible for Machoka. Soon problems, digging stopped. Misunderstanding, communities believing this to be 'food for work' project rather than 'self help' project. Problem temporarily resolved but to occur again in different forms. Community meetings attended by Plan at this time determined communities to pay five men at each site for digging (totals of $3000 at Masekesa, $1000 at Machoka).

Jun 94 Problems of payment. Down to one or two men only on some days, working less than half days. Importance of well organised, well attended community meetings **before** any work begins now becoming absolutely clear. Plan staff requested to visit regularly.

Jul 94 Slow progress further hampered by hard rock. This should have been recognised during exploratory drilling but was not due to inexperience of DWD drillers in this operation and use of a large drilling rig. Wear and tear on digging equipment, but primary reason for slow progress the poor community participation and consequent short working hours. Community leaders promise more men but not forthcoming.

Aug 94 Payment problems continue. Cash a commodity that these communities have little of or find difficult to collect communally. Various stories of political differences and power struggles between leaders and within communities, communities even described as difficult to work with. DWD counterpart giving food to few noble men still working without pay. Agent for Plan living in community aware of problems but unable to tackle such community issues. Late in the day but community meetings arranged with staff of Plan and LVRS. Outcome principally that insufficient time spent with communities before work began leading to misconceptions about type of project and intended beneficiaries, unhappiness about site position, uncertainty about community interest, stories of disunity etc. Key point again the need to discuss all such issues thoroughly with community **before** work begins (if work is to begin).

Sep 94 Trip to Zaka site #5 for leaders of Sangwe to let them see what has been achieved by other communities and to exchange ideas on community participation: here 30 men did digging and paid $10 to join garden, non-digging persons erecting fence or preparing land paid $70, non-working persons paid $90. Importance of unity, need and interest clear. New optimism at Sangwe but realisation that tied now to cash payment and inherent problems. Surprise development at Masekesa: Chiredzi Rural District Council fit engine and mono pump to nearby borehole to supply new beerhall 1km away. Loss of domestic water for community and introduced threat of groundwater depletion around well. Surprise to community and Plan alike, but water for beerhall apparently discussed at Council meeting in June when possibility of using the collector well was even put to Plan. Plan decide to proceed with well.

Oct 94 General improvement in labour supply. First vegetables planted using water removed during digging. Monitoring of water level during use of mono pump initiated. Digging completed at Masekesa to 17m, at Machoka to 11m. Radial drilling and pump tests underway at present.

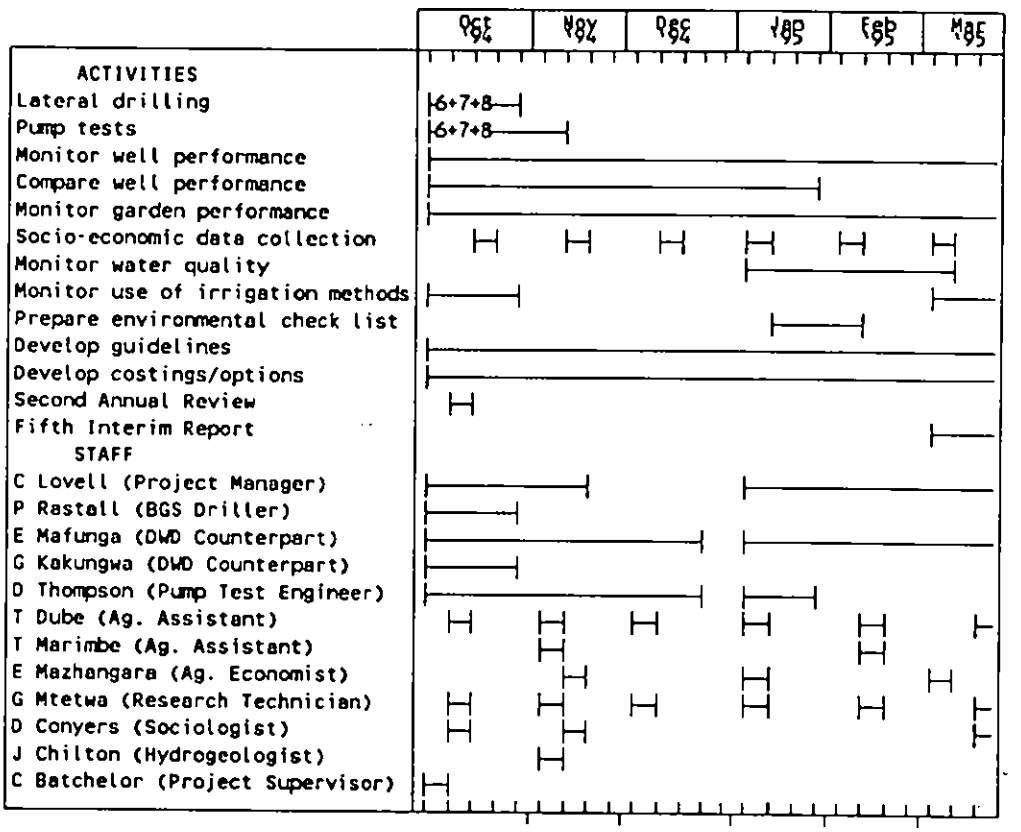
Although the project remains to be completed and further technical results will be forthcoming, the work with Plan International, an NGO actually involved with community development issues has already been extremely valuable. The involvement of an organisation of this kind has highlighted and confirmed key steps that must be taken during the development of such schemes, if the recipient community are to successfully implement the project in an efficient and sustainable manner. Also, the work has highlighted the serious gaps and omissions that can develop a) if different aspects of scheme implementation are undertaken by separate organisations without a single authority responsible for checking that all steps are taken (in this case, a drilling contractor constructing on behalf of an NGO) and b) if full use is not made of local institutions and information available (in this case, Agritex

were not involved and were sorely missed, and proposed developments by other organisations ie. District Council were not considered).

These findings have serious implications for the way in which any future development of community gardens using groundwater should be implemented and the complete inter-disciplinary team of people ideally required in order to undertake and be responsible for all of the steps known to be required.

4 Programme of work for the next six months

The following is the programme of work proposed for the next six months:



4.1 STAFF

Ms Murata, Senior Research Officer at Chiredzi Research Station and project counterpart, transferred to DR&SS Harare in August 1994. A replacement has not yet been appointed at Chiredzi. Ms Teresa Marimbe, Agricultural Assistant, will continue to meet and collect social data with groups of women.

Mr Brown, ODA TCO Agricultural Economist based at Chiredzi Research Station, completed his contract in September 1994. Mr Mazhangara, DR&SS Agricultural Economist, has taken over the provision of socio-economic advice following Mr Brown's departure. Each site continues to be visited on a monthly basis to collect records on inputs and outputs and to monitor general progress from both an agricultural and social point of view. Retail prices for

vegetables are recorded at the main market centre of Jerera. Agricultural Assistant, Terence Dube, is now responsible for data collection and is able to summarise it on computer. He will assist Mr Mazhangara to write the reports for each site at the end of each season.

Mr Mtetwa, Research Technician at Chiredzi Research Station, will assist Mr Dube and Mr Mazhangara to collect socio-economic data. He will also assist Mr Thompson, ODA APO, to monitor well performance and will take over this duty when Mr Thompson's contract ends in January 1995.

Mr Rastall, BGS Driller, will complete his assignment in October 1994 when drilling operations for the present project will cease.

4.2 TRAINING

One anticipated output of the Pilot Project is a core of trained staff in Government capable of running collector well gardens (PDS BDDSA, 1992).

To achieve this objective, staff of DR&SS, AGRITEX and DWD have been involved in all aspects of scheme implementation from the beginning. It is pleasing to note that field staff of Agritex are now fully responsible for working with the communities at each site to develop and run the gardens, and are highly revered by these communities (Appendix 3). As outlined above, staff of DR&SS are also fully responsible for monitoring garden performance and collection of socio-economic data to assess impact of the schemes on the communities.

However, to create a core of trained staff actually capable of constructing collector well gardens has proved to be a more difficult task, for reasons that are quite understandable. A DWD counterpart, Mr Mafunga, has been made available from the beginning of the project for training in construction techniques. He has worked hard and has proved to be an important member of the team, being made responsible at one time or another for all aspects of scheme construction. All aspects that is *except* radial drilling. Drilling is a specialist job that can be done well by the right type of person. Mr Mafunga was not a driller prior to this project; the development of six sites did not afford the opportunity for DWD to allocate high calibre staff to a small project given current resource constraints. He may in time be capable of becoming a driller if given the opportunity but the expatriate driller best able to judge this has doubts and is reluctant to risk serious damage to the equipment also required by British Geological Survey for other work elsewhere.

The expatriate driller may be wrong but the situation reached a stalemate. To improve upon this situation, a request was made to DWD both in Harare and Masvingo to provide for only short periods (a few days only) other drillers either from DWD or DDF to be trained in radial drilling at the last wells. No drillers were made available even for the short periods suggested. This is unfortunate because, as has been shown by work in Botswana, under guidance a driller of the right calibre can pick up the techniques of radial drilling relatively quickly and thereafter perform this task alone. One additional technical hand 3 from DWD, Mr Kakungwa, was made available. Although not a driller, Mr Kakungwa has shown considerable potential in a short time and it is a pity that work in the present project is now ending.

At present, the following Zimbabweans are versed in some aspects of collector well construction:

Mr Mafunga	DWD counterpart	All aspects except radial drill operation
Mr Chikuni	DWD Driller	Exploratory drilling for Plan schemes
Mr Masite	DWD Driller	Exploratory drilling for R&D in 1989
Mr Kakungwa	2nd DWD counterpart	Recently started, showing promise
Mr Chiunye	Employed as foreman	All aspects except operation of drill rig
Mr Musanhu	Employed as foreman	All aspects except operation of drill rig

The above information is not intended to be critical, rather to outline a problem faced in the present pilot project and help ensure that this aspect is seriously addressed if further work is contemplated.

5 Replication of schemes on a wider scale

Strong interest in extending the pilot project has been shown by local communities and external agencies. Donor/NGO interest has been expressed by World Vision, Plan International, Christian Care, GTZ and IFAD.

5.1 IRRIGATION SYSTEMS OPERATING IN SOUTHERN ZIMBABWE

Table 2 provides indicative values of agro-economic performance of community gardens using groundwater compared to other types of irrigation system operating in Southern Zimbabwe. Clearly, there is an important role for community gardens using groundwater designed to address the priority objectives of nutrition and health, poverty reduction and income generation in these drier areas.

For people fortunate enough to live near to a dambo or wetland, development of a dambo garden is shown to be a low cost venture that can be extremely viable. Where this is not possible in the drier parts of the country or is not allowed (dambo gardens are illegal at present) the need for a high yielding well or borehole increases capital costs. However, gross margins per unit of land and water are high on schemes with smaller holding sizes because they are more intensively cultivated (Meinzen-Dick et al, 1993) and Table 2 shows that this trend continues down even to the very small allotments held by members of community gardens drawing water from collector wells. These schemes are shown to yield an attractive internal rate of return, and it is interesting to note that their performance is comparable to that of a successful small, surface-water based scheme recently started at Chirogwe Dam in nearby Chivi District.

Gross margins shown must be considered indicative only because assumptions used to calculate the values for schemes other than those in this project are not known eg. was hired labour used; what output prices were used; how did these vary between the schemes; was the value of home consumed produce included in the gross margin and if so how was it valued ? Typically half of the produce grown on community gardens drawing water from collector wells is home consumed. The value of this produce is included in the gross margins shown and was valued at the selling price.

Table 2 *Indicative values of agro-economic performance of various types of irrigation systemoperating in Southern Zimbabwe.*

Name	Natural region (rain)	Size (ha)	Type of scheme	Number of members	Average area per family (ha)	Gross Margin (Z$/ha) Summer (crop)	Winter (crop)	Annual total ($/ha)	Gross margin per unit of water ($/ha/m)	Typical cost per hectare (Z$/ha)	Approx cost per scheme (Z$)	IRR (%)
ADA Chisumbanje[1]	V (450 mm)	2400	River water pumped to canals & syphons	118	3.60	1370 cotton	707 wheat	2077	n.a.	35000[2]	84,000000	5
AGRITEX Towona[1]	V (408 mm)	151		245	1.20	1336 maize	1530 tomato	2866	2186	35000[2]	5,285000	8
AGRITEX Mabodza[1]	IV (660 mm)	12	Gravity fed from dam to canals & syphons	92	0.13	777 maize	3562 tomato	4339	2355	100000[2]	1,200000	3
AGRITEX Chirogwe[3]	V (500 mm)	5		105	0.05	7877 rape & tomato		7877	n.a.	60000[3]	300000	13
DAMBO GARDEN Mushimbo[1]	III (708 mm)	12	Buckets of water from shallow dug wells	14	0.89	1557 mealies	1022 veg	2579	3384	5000[4]	60000	52
DAMBO GARDEN Mbiru[1]	III (743 mm)	4		57	0.07	3125 mealies	2637 veg	5762	3359		20000	115
COMMUNITY Tamwa[5]	IV-V (560 mm)	0.5	Collector well & two handpumps, water by buckets to community garden	46	0.01	2388	17520	19908	52197	96000[5]	83500	12
Muzondidya[5]				134	0.005	15628	2576	18204	38211			11
Gokota[5]				112	0.005	-	25444	25444	40999			15
Dekeza Sch[5]				49	0.01	-	13748	*	*			
Mawadzw[5]				50	0.01	-	1690	*	*			

Source 1) Meinzen-Dicl et al (1993) Agroeconomic performance of a smallholder irrigation in Zimbabwe, UZ/IFPRI/Agritex Workshop, Zimbabwe, Aug 4-6
2) FAO (1994) National Action Programme on Water and Sustainable Agricultural Development, Zimbabwe.
3) Agritex (pers. comm). Figures based on first tow years of operation, 1991-93.
4) Estimate based on cost of fencing alone.
5) Lovel et al (1994) Small scale irrigation using collector wells Pilot Project-Zimbabwe: 4th Progress Report, Institute of Hydrology, UK.
6) Financial analysis: IRR calcualted for a common project life of 40 years (assuming proper maintenance and sustainable use of natural resources) and a social discount rate of 13 percent.
*) Not yet completed one full year.

The assumption made in the financial analysis that sustainable use of natural resources will ensure a common project life of 40 years for all types of irrigation system is a very weighty assumption. In Masvingo Province, many dams now have less than full capacity due to siltation. Serious degradation of dambos has occurred in Zimbabwe during the last forty years and remains a highly topical issue as present. High yielding agro-wells developed in other countries have led to problems of groundwater depletion; similar could occur in Zimbabwe if rational use and careful monitoring of the groundwater resource does not go hand in hand during development. In all cases, development of a community garden should be seen as an opportunity to initiate and form the focal point of a concurrent, community-based approach to integrated land and water management in that particular small catchment.

5.2 DEVELOPMENT OF COMMUNITY GARDENS USING GROUNDWATER

Experience and knowledge gained so far during the pilot project and during work for Plan International can begin to be distilled and first guidelines drafted to assist future development. Figure 4 shows the key steps now known to be important to achieve successful collaboration with communities and to help ensure implementation of schemes likely to be sustainable from a social point of view. Collector wells will not always be the most appropriate way to abstract groundwater. Figure 5 shows keys steps required to determine the most cost-effective well type to support a community garden in any area.

5.2.1 Key steps

The key steps shown in Figure 4 are not a prescription. They are a guide (that is still being developed) and will vary to some extent between different areas and different communities. The following notes are provided:

1 Liaison at District Development Committee level at an early stage should help to identify all proposed and existing water development projects in the District, allow the present programme to be complementary in its approach, and avoid either wasted reconnaissance visits to areas proposed for other types of water development or surprise developments once work has started in an area. Records for existing wells and boreholes (in Masvingo Province at least) are held at the District Offices of DDF (on file), at the Provincial Offices of DDF (currently being compiled on computer database) and DWD (on useful maps but not up to date), and at the National Office of DWD (on file). The data does not always include rest water level and groundtruthing will be necessary.

2 Although there can be no substitute for genuine community interest and commitment, one advantage of developing several schemes in one area at a time, for example in a Ward, is that communities there can see what is possible and be encouraged by progress at the first scheme undertaken. Healthy competition can develop between communities in the area and other communities from nearby can approach to express their interest in the project. A standard approach to scheme development should be adopted to avoid any suggestion of favouritism. A second advantage of working in one area at a time is logistical improvement to monitoring, servicing and maintaining construction teams.

3 Liaison with field staff of Agritex alone may not be sufficient during site identification. Needy communities will be identified but these may be in areas

Hypothetical Target: 250 farmer-managed community gardens in Southern Zimbabwe irrigated using groundwater. Each garden to be 0.5ha or larger and to serve upward of 50 families. Each will require a minimum of 15 cubic metres of water per day (including domestic water) abstracted using the most appropriate well design determined for the area.

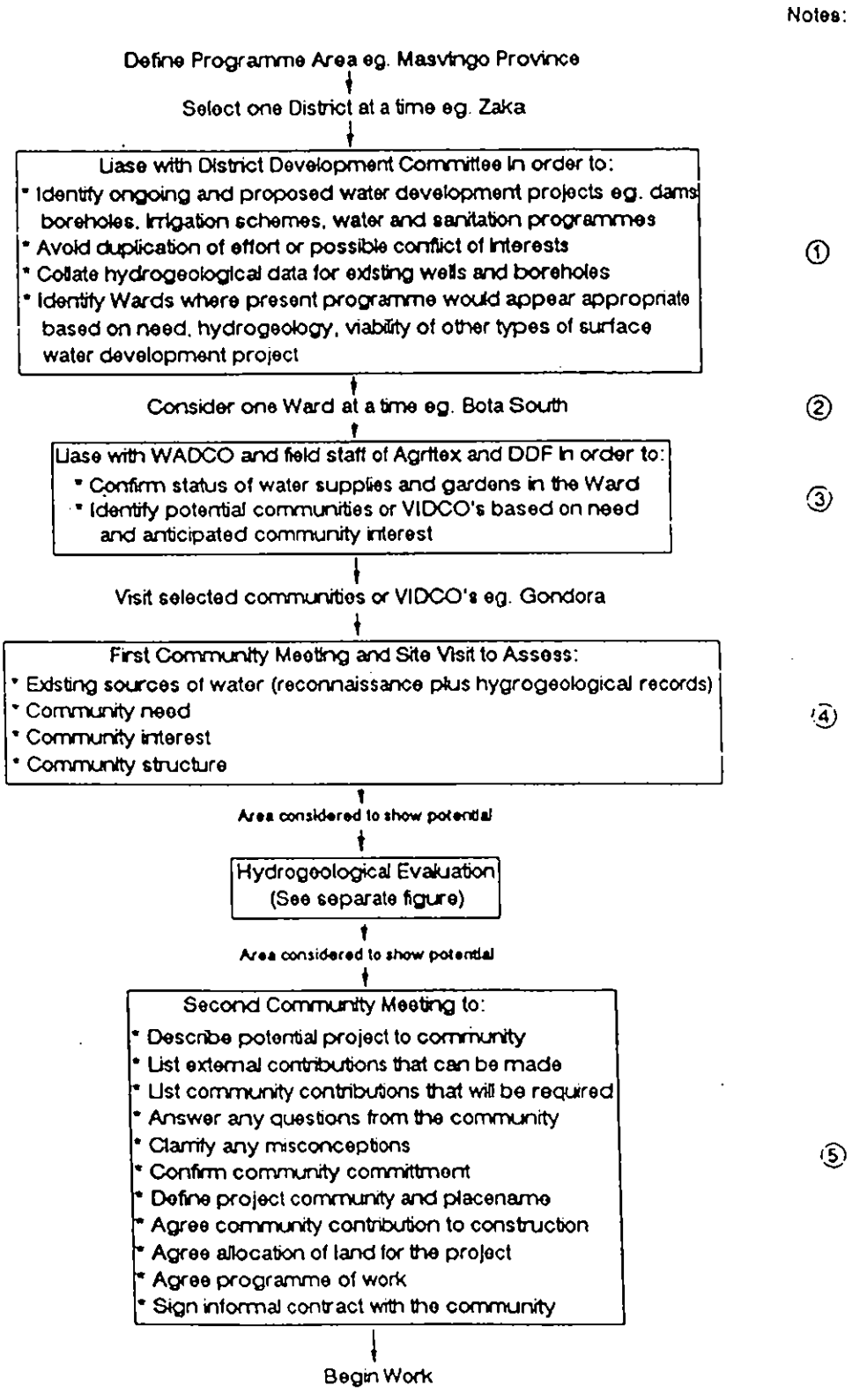
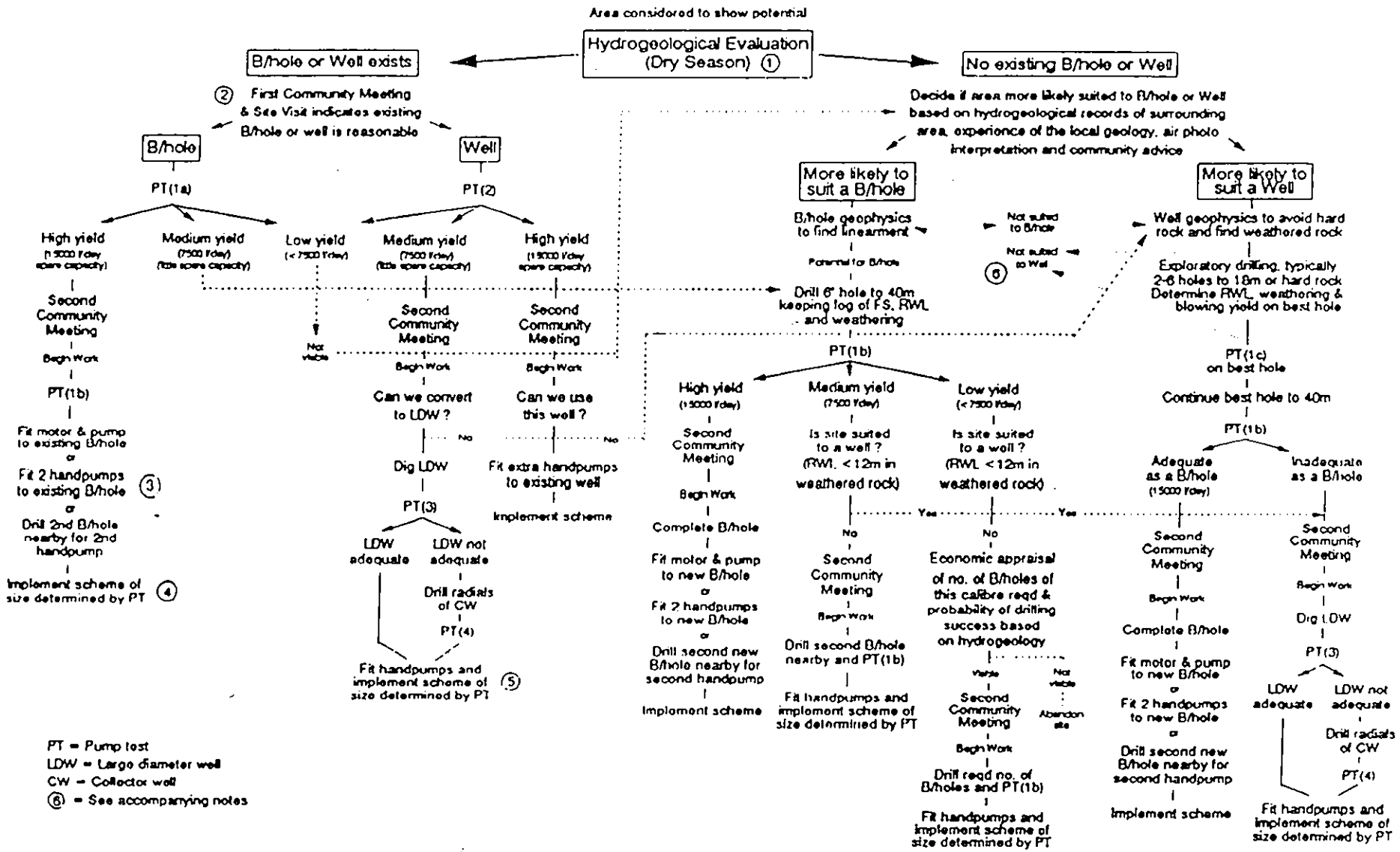


Figure 4 *Key steps to be taken in development of community gardens using groundwater.*

Figure 5 *Key steps to be taken in hydrologeological evaluation of potential areas during development of community gardens using groundwater.*



unsuitable hydrogeologically. The knowledge of local field staff of DDF and NGO's involved in well digging programmes can help at this stage.

4 The importance of community meetings to the successful development of community gardens using groundwater cannot be overstated. They are the key steps in the sequence shown. No work should be done in an area until local leaders have been consulted. Sufficient time must be allocated to allow these meetings to be well organised, attended by all leaders in the community, and considered afterwards by both community and project staff. Topics to be discussed at the First Community Meeting include:

* The present water situation: where are the present water sources; how do these perform, now and during drought; what is the present water use; where are old well sites; where is the water table shallow or the rock soft ?
* The present garden situation: do gardens exist; who has a garden; what is the water source; how do these perform; what was the situation in the past ?

* Community structure: who are the local leaders; what community is perceived for the new project; how many kraals would be served; where are these located; how many families are in each; where would the project best be sited ?

* Community need and interest: is domestic water or garden water scarce; how many families would benefit from a project; how many would participate; would land be available; would market opportunities exist ?

5 In Southern Zimbabwe, it will be rare to meet a community that does not have need for or express interest in a community garden using groundwater, particularly as the new well will also offer clean drinking water. Thus, during the first community meeting it is important not to raise community hopes too high. It should be explained at the outset that the project may be possible only if further drilling tests are positive. If hydrogeological evaluation then proves to be successful, the Second Community Meeting provides the venue for more detailed discussion: to explain fully to the community what can be possible if the community so wishes; clarify misconceptions; confirm community commitment; agree community contributions that will be required.

This process may sound easy but may not always be so. Among other things, it will depend upon the type of scheme being implemented (borehole or well, new or existing); effort required (shallow or deep water, soft or hard rock); type and extent of community contribution hoped for (eg. part payment of project costs, voluntary labour, food for work, paid labour, or combination thereof); presence of good local leaders; the culture and prosperity of the people.

Experience suggests that monetary payment for work done should be avoided whether this be payment by project staff or by other community members. In the former case, payment promotes neither sense of ownership nor good progress. In the latter case, payment causes only problems because it is one commodity that the communities in this area generally have little of or find hard to collect communally. Automatic membership of the project for those people who do the work is to be preferred, others paying a cash joining fee at a later date. This money can then be used by the members to start the garden.

When defining the project community, care should be taken regarding the presence of existing or even apparently defunct gardens, as these may later place a limit on membership of the new scheme if this issue is not discussed.

5.2.2 Hydrogeological evaluation

The following notes are provided to go with Figure 5:

1 Hydrogeological evaluation of potential sites should be performed during the dry season from May to October. This is because well yields and water levels at this time will be at their lowest with minimum depth of saturated aquifer. It is also when peak demand for irrigation will occur in the scheme.

2 At potential sites where a borehole or well exists that might be developed, additional things to be established during the first community meeting are:

i) performance of the water point particularly during drought;

ii) present water use to ensure that this be maintained;

iii) alternative water supply to use while work proceeds;

iv) schedule of work including local person to assist with initial pump test.

3 15 m^3 of water per day is the target required per scheme. This cannot realistically be abstracted using a single handpump as normally fitted to a borehole but can be achieved using two handpumps drawing water at 0.3 l/s for 7 hours per day. Hence the two handpumps fitted per collector well or large diameter well, the need to drill a second borehole to complement a first, or the need for two new boreholes if none exists. The option to fit an engine and mono pump to a single high yielding borehole is generally not to be preferred because of increased maintenance problems, running costs, and the danger of groundwater depletion. The option to fit two handpumps to a single high yielding borehole is hypothetical at this stage. Some high yielding boreholes are underutilised at present because abstraction is limited by the single handpump fitted. Such boreholes could better serve the community and a community garden if modification allowed a second handpump to be fitted, but this possibility has not yet been developed.

4 If pump tests indicate that greater than 0.5ha can safely be irrigated and community need warrants a larger scheme, this is entirely possible.

5 The possibility also remains to return and convert a large diameter well to a collector well at a later date if necessary.

6 Important questionmarks and gaps in our knowledge remain with respect to certain steps and decisions shown in the figure. In particular:

i) Geophysics may have a role to play in siting high yielding boreholes or in reducing the number of exploratory holes required to site a high yielding well, but the value of this approach has not been tested in the present project;

ii) It is possible that a site found unsuited to a well using well geophysics and

or exploratory drilling may also be found unsuited to a borehole by borehole geophysics. The decision will then remain whether to proceed with drilling or abandon the area;

iii) In principle it makes good sense to develop existing water points underutilised at present. However this approach must consider the safe aquifer yield. Monitoring of the resource will be important and ideally an integrated approach to management of the surrounding catchment should be initiated concurrently to maintain and ensure groundwater recharge;

iv) The principle of drilling a second borehole near to a first to create a borehole community garden has not been tested in the present project;

v) Community participation in scheme construction and the associated benefits that this brings particularly in sense of ownership will vary between schemes implemented in different ways and is likely to be less in schemes based on a borehole than on a well dug by the community.

Pump tests required for hydrogeological evaluation

At each potential site, the objective of hydrogeological evaluation is to establish the most cost effective well type capable of yielding at least the minimum target of 15m^3 of water per day required for gardening and domestic use. To achieve this, project staff will require fast, reliable estimates of yield of both existing and newly constructed wells and boreholes in an area. The drawdown and recovery tests outlined below are quite simple to perform and to analyze. Software packages 'BGSPTFIT' and 'BGSPTSIM' will indicate aquifer characteristics, simulate well behaviour for long term pumping regimes, and determine the sustainable yield for one year. With experience it should become possible to establish a direct relationship between the standard test results and estimated yield thereby reducing time needed for analysis.

The tests provide a best estimate of well or borehole yield that can be sustained over a normal dry season assuming full recharge in the wet season. However, they can make no attempt to predict well performance during or following a low rainfall year. Assumptions made concerning aquifer homogeneity and extent also mean that under sustained pumping the accuracy of predicted yields may be reduced. Monitoring of well performance with actual use will therefore be important and provision to allow this to be performed by the community should be considered wherever possible.

Test number	Description	Pump Time (min)	Pump Rate (l/s)	Output (T = transmissivity) (S = storativity)
1a	Rapid evaluation of existing bh using bush pump	60	0.5	T,S,yield
1b	New 40m bh tested using elec submersible	300	0.5	T,S,yield
1c	Evaluation of 15m exploratory hole	60	0.2	T,S, estimated ldw yield
2	Evaluation of an existing well	60	1.0	T,S,yield, est.ldw yield
3	Evaluation of a large diameter well	300	1.0	T,S,yield
4	Evaluation of a collector well	300	1.0	T,S,yield, %improvement on 3

All tests must be performed from rest water level and the recovery of the well to this level prior to the test should be monitored. Recovery measurements should be made for at least 80 percent of the test drawdown.

5.2.3 Personnel

One important implication of the guidelines shown is the inter-disciplinary team of people that is required to undertake and be responsible for all of the key steps now known to be important in development of community gardens using groundwater. This team should include:

Agricultural Extension Officer	(AGRITEX)
Community Development Worker	(NAT.AFF or MOH)
Scientist: Monitoring	(DR&SS)
Pump Test Engineer	(DWD,DDF)
Driller	(DWD,DDF)
Assistant Driller/Crane Operator	(DWD,DDF)
Mechanic	(DWD,DDF)
Geophysist (optional)	(DWD,DDF)

plus

Team Leader (overall coordination and responsibility)
Site foremen (number based on scale of operation)

5.2.4 Capital costs

A framework for analysing the capital cost of collector wells and boreholes has been developed. Appendix 6 provides one example: equipment, staff and material costs for a hypothetical programme to develop 25 schemes per year for 10 years to be implemented by an inter-disciplinary team using one set of drilling equipment and five sets of digging equipment simultaneously digging five wells per year and using a local concrete well lining.

The example given is for a semi-commercial approach, whereby Government or an NGO contracts a commercial company to put in the schemes. The company charges the full cost to cover the commercial rate of interest (25%, which it uses to write off its equipment) and includes a profit margin of 25%. Government or NGO writes off its investment at the social rate of interest (13%). This is the yardstick set by Government through the Agricultural Finance Corporation (AFC) for appraising projects aimed at benefiting the small-holder farming sector. The following capital costs per well result:

Scheme type	Interest Rate		Profit %	Cost Z$	ACC Z$/m^3
	Constr	Amort			
Coll well & 2 handpumps	25	13	25	110882	3.70
Two B/holes & handpumps	25	13	25	121568	4.06
One B/hole & motorpump	25	13	25	108000	3.61

If a fully commercial approach were taken, the schemes would be written off at the commercial rate of interest (25%). This would apply where it is believed that a development project should be appraised according to strict commercial criteria and where "full cost recovery" is the order of the day. This has the effect of increasing the annual capital charge needed to amortise the schemes over 10 years:

Scheme type	Interest Rate		Profit %	Cost Z$	ACC Z$/m^3
	Constr	Amort			
Coll well & 2 handpumps	25	25	25	110882	5.63
Two B/holes & handpumps	25	25	25	121568	6.17
One B/hole & motorpump	25	25	25	108000	5.48

If Government itself undertook construction of the schemes the social discount rate of 13% would apply both for writing off equipment used in construction and for writing off the schemes. A profit margin would also not be included. This has the effect of reducing both the capital cost of the well and annual capital charge but involves a significant subsidy by Government:

Scheme type	Interest Rate		Profit %	Cost Z$	ACC Z$/m^3
	Constr	Amort			
Coll well & 2 handpumps	25	13	0	76423	2.55
Two B/holes & handpumps	25	13	0	98040	3.27
One B/hole & motorpump	25	13	0	90857	3.03

Costs for the collector well assume that labour for digging is provided free by the community. Experience has shown that not only does this save time and money (compared with employing wage labour) but it also enhances the community's sense of ownership of the scheme. Abstraction from the collector well is by two handpumps. Two boreholes with handpumps would be required to yield 15m^3 per day required for domestic use and irrigation of 0.5ha. A high yielding borehole with motorpump is shown to be an option where this can be sited but a drilling success rate of only 35% is given by DWD figures for the whole country (Wright et al, 1989) and this type of scheme will have higher running costs and difficulties of repair that may prove to be beyond the means of poor rural communities.

5.3 COMMUNITY GARDENS AND THE NATIONAL ACTION PROGRAMME

Use of groundwater to develop community gardens to reduce poverty and improve nutrition in the drier areas of Zimbabwe is consistent with the National Action Programme on Water and Sustainable Agricultural Development (FAO, 1993). Aspects of the present work that appear particularly relevant to this programme include:

* *Assessment and rational development of groundwater*: the present work is addressing the reported need for assessment and rational development of groundwater resources, particularly in those areas of low groundwater potential, the areas of basement complex rock that cover about two thirds of the country and where potential for other water resources is limited.

* *Guidelines for planning, development and management of smallholder irrigation projects*: the present work is developing guidelines for the planning, development and management of community based irrigation.

* *Self reliance*: the present work is concerned with developing self reliance within rural communities. Sense of ownership is addressed from the beginning when the scheme is requested by the community and then actually constructed by them. Training in pump maintenance and garden management thereafter releases the people from need for further external inputs.

* *Water use efficiency*: an important aspect of the present work, both via extension of research on efficient methods of garden irrigation and via monitoring of water use. Results (Table 2) suggest that community gardens using groundwater are a relatively efficient type of irrigation system.

* *Environmental aspects*: development of community gardens using groundwater appears to also offer an ideal and perhaps unique opportunity to form the basis and focal point of concurrent, community-based integrated management of land and water resources in each particular small catchment developed. In this way, the people themselves will become responsible for the life of their scheme, and in so doing will also begin to address the problems of environmental degradation perhaps too daunting if considered as a whole.

* *Activity and donor coordination*: by bringing together water, agriculture and community development, the present work provides an example of success made possible by activity coordination between different GoZ Departments. However, it highlights the need to form an inter-disciplinary team of staff from each department if community gardens using groundwater are to be developed on a wider scale. Such development would appear to lend itself to donor coordination, by co-funding either area by area or piece by piece (eg. equipment, materials, staff).

6 Acknowledgements

Many staff of MLAWD have given their advice and support to this project during the fourth six months of work. Particular thanks also go to Social Development Adviser, Dr Diana Conyers for her continued assistance. Funding for the project has been obtained primarily from the British Government's Overseas Development Administration.

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Appendix 1: Site #6 as Matedze

District (Communal land)	Zaka (Ndanga)
Ward	28, Bota South
Extension Worker	Mr Bvudzijena, Chivamba B/C
Placename	Matedzi
Kraal(s)	Bomero; Chekero; Mushuko; Makonese; Guyo
VIDCO (Chairman)	Gondora (Mr Chiradza); Chivamba (Mr Chinobeta)
Grid Reference	Map 2031 C2; 306 205 31°23'E 20°37'S
Initial Site ID by:	Project staff noting sandriver during drought; community writing and in person to Dekeza.
Site Location	1km off road Chivamba - Dekeza, turning N at painted house Mr Kwaramba 2km west of Chivamba
Landform / Catchment	Bottom of valley side near confluence of small sand river and stream.
Geology	Younger mobile belt gneiss
Community Structure	229 households in 5 kraals in 2 VIDCO's, 0.5 - 3km radius from well and garden. 2 kraals Tori and Tichano considered too far away at 5km.
Present Water: Domestic	Severe shortage: spring uphill to Sept, then poor well or sand river or Chivamba 2-3km away
Gardening	Severe shortage: families of Bemero, Chekero and Makonese previously had garden at sand river before water shortage. Families of Guyo and Mushuko never had access to water/garden.
Present Vegetables	None
Community Enthusiasm	Excellent, first meeting attended by 4 headmen Cncl Gondo, 30 men and 40 women from all seven kraals, confirming the need. Second community meeting attended by 7 leaders representing the community and garden committee (5 men,2 women)
To serve: Domestic	Priority, estimate 200 households
Gardening	Priority, estimate 60 households
Land Allocation	Decided immediately when kraalhead consulted
Market Opportunities	Appear good, Chivamba and tar road nearby
Other factors	Area noted during drought of 91/92 by sand river still with some water. Need highlighted by letter written and visit by community when they saw work at Dekeza. Impression all along of need for water and challenge for collector well. Informal agreement between community and project again tested here. Highly successful, work voluntary and well completed rapidly.
Overall Impression	Site appeared suitable for collector well with radial under small sand river. Many sites like this exist in Southern Zimbabwe. A very needy community and a good test of a collector well.

Appendix 2: Baseline household surveys for site #6 Matedze

Farms and households in the vicinity of Bomero, Guyo, Machekero, Makonese and Mushuku, prior to the installation of a Collector Well in 1994.

M.W. Brown* and T. Dube** June 1994
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1 INTRODUCTION

This collector well is to be sited near to the Matedze river which is likely to give its name to the scheme. Members of the community reported that a total of 206 households spread amongst the five villages as above are likely to be within range of the well.

2 METHODOLOGY

The survey was conducted during May 1994 amongst a randomly selected sample of 30 households. There was a bias towards female respondents with only 7 per cent of interviews being with men alone. Ninety per cent of households were represented at the interview by the household head and/or spouse.

Table 1 *Identities of survey respondents*

Respondents	Per cent of households
Men only	7
Women only	60
Men and women	33

3 SOCIAL ASPECTS

3.1 Family size and labour force

The following Table 2 depicts the average composition of sample households.

Table 2 *Household composition*

	Average number per household:	
	Total available	full-time for work on family home and farm
Men	2.2	1.4
Women	2.3	2.1
Children (5-15)	2.4	0.1
Infants	1.2	0
Totals	8.1	3.6

* Technical Co-operation Officer, Overseas Development Administration, U.K.
** Agricultural Assistant, Chiredzi Research Station, Ministry of Lands, Agriculture and Water Development, Zimbabwe

Thirty nine per cent of men are unavailable for full time farm work, all of whom are away working. Triangle is the most popular place of work accounting for 16 per cent of men. Ninety per cent of women are at home full time, four per cent are attending school and six per cent are working. Overall, 63 per cent of households have at least one member earning a full-time income away from the family farm. Ninety six per cent of children are attending school. Again women make up a majority of the labour force although only ten per cent of households are without a man full-time, while ten per cent of households are headed by women.

On the basis of appearances, 80 per cent of respondents are estimated to be in the middle age range of between 30 and 60 years with seven per cent estimated to be under 30 and 13 per cent over 60 years.

3.2 INDICATORS OF WEALTH

Sixty four per cent of families occupy traditional style compounds of pole and dagga huts while 23 per cent live in predominantly modern style homesteads constructed with bricks and asbestos roofs. The remaining 23 per cent occupy compounds containing a mixture of the two styles.

The main items of capital owned by farmers are livestock and implements. Livestock ownership was dramatically affected by the drought of 1991-92 as the following Table 3 shows.

Table 3 *Livestock ownership*

	Cattle:		Donkeys:		Sheep:		Goats:	
	Pre - 1992	Now	Pre-	Now	Pre - 1992	Now	Pre-	Now 1992
Per cent farmers owning	73	27	7	3	0	0	67	60
Total head	179	17	10	1	0	0	221	154

Prior to the drought, ownership of cattle was widespread and relatively evenly distributed with 40 being the most number of head owned by a single household. The main implement (after the hand hoe) is the animal drawn plough one each of which is owned by 90 per cent of households. Just one household (three per cent) owns an animal drawn "scotch cart". Based on these indicators of wealth and on visual observations, 37 per cent of households are judged to be "average", and 50 per to be less well off while 13 per cent appeared to be relatively affluent.

3.3 HEALTH

Malaria was again virtually the only disease mentioned with 37 per cent of respondents. Diarrhoea was noted by one respondent who attributed it to poor sanitation brought about by an inability to afford the cement needed to build a latrine.

3.4 VEGETABLE CONSUMPTION

Table 4 *Frequency of vegetable consumption*

Frequency	Per cent of households
Mainly during the summer	100
Mainly during the summer and winter	0
All or most days throughout the year	0

All households said that they are only able to consume vegetables on a frequent basis during the summer months, normally from November to April when inter-cropping of vegetables with rainfed cereal crops is widely practised. The main sources of vegetables for households are summarised in the following Table 5 (some respondents gave more than one source).

Table 5 *Main sources of vegetables*

Source	Per cent of households
Rainfed fields	100
Purchased	100
Own gardens	3
Wild	0

The importance of rainfed vegetables is clear from the above Table 5 though surprisingly nobody rated gathering of wild vegetables as significant. The potential for a community garden in the area is demonstrated by the fact that all families also rely on purchased vegetables while only one household (three per cent) can depend on produce from its own garden.

Again the winter months from May/June to September/October are said to be the times of greatest scarcity for vegetables. Drying of vegetables for consumption during this period is said to be practised by 100 per cent of households.

3.5 COMMUNITY PROBLEMS

As the following Table 6 shows there is relatively close agreement amongst respondents regarding the problems which most beset the community.

Shortages of water for both domestic and gardening purposes together with a shortage of draught animal power are again said to be the main problems facing the community. One hundred per cent of respondents said that they do not normally have enough water for domestic purposes and this is backed up by a relatively low average consumption rate of 98 litres per household per day. However 100 per cent of respondents are anticipating using any

extra water for gardening compared with only 23 per cent for domestic purposes probably reflecting the fact that at present they do at least have some domestic water whereas most households have non for gardening. Moulding of bricks is also said to be a potential use for 67 per cent of respondents together with 37 per cent who need more water for building purposes, such as plastering of houses. Extra water for cattle, beer brewing and fruit trees were each mentioned by seven per cent of respondents.

Table 6 *Community problems*

Problem (all shortages of:)	Per cent of respondents
Domestic water	93
Water for gardening	77
Draught animal power	73
Land	10
Money	7
Reliable rainfall	7
Firewood	3

4 Economic activity

4.1 RAINFED FARMING

All households engage in rainfed cropping which is the principal form of economic activity in the area. The areas cropped and yields said to be obtained by farmers during a "normal" year are presented in the following Table 7 together with the estimated gross values of production based on 1992-93 GMB prices.

Table 7 *Cropping patterns*

Crop	Per cent farmers sowing	Per cent total crop area	Average crop area hectares per farm	Average yield Kg ha^{-1}	Average Gross Income $ per farm
Maize	100	39	0.89	1 127	906
Sorghum	77	18	0.41	768	164
Finger millet	70	15	0.36	878	163
Groundnut	47	12	0.28	340*	113
Sunflower	33	6	0.14	311	62
Pearl millet	27	6	0.14	758	52
Cotton	10	4	0.09	459	130
Totals					2.31

* Unshelled

Maize is the main crop and is grown by all households with finger millet, pearl millet and sorghum as secondary grain crops; 93 per cent of farmers grow at least one or other of these. The main cash crops are groundnuts and sunflowers, though they contribute relatively little to the gross income and only 53 per cent of farmers cultivate one or other of these.

Farmers' estimates for production and the resulting average yields are relatively low, but may have been influenced by the season which had just ended. An early end to the rains meant that long duration crops such as cotton and late sown crops such as sunflower recorded particularly low yields. Average annual grain production at 1 740 kilograms per household is relatively low and sufficient for less than two years' consumption by an average family.

The following Table 8 shows the variability in holding sizes.

Table 8 *Distribution of average cropped areas*

Range hectares	Per cent of households
0	-
0.1-1	20
1.1-2	27
2.1-3	27
3.1-4	13
Over 4	13

The distribution is uneven in that the smallest 40 per cent of farms occupy 19 per cent of the total cropped area while the largest ten per cent take up 21 per cent although the largest farm is only 5.1 hectares. The figures for average gross crop incomes are close to net incomes since the only input costs are likely to be hybrid maize seed. The average annual total crop income of $1 591 is relatively low due to the limited production of cash crops. The following Table 9 shows the distribution of rainfed cropping incomes.

Table 9 *Distribution of average gross incomes from rainfed cropping*

Range $	Per cent of households
0	0
1-1 000	46
1 001-2 000	27
2 001-3 000	17
3 001-4 000	7
Over 4 000	3

The poorest 40 per cent of households account for only 16 per cent of total incomes earned from rainfed cropping and average just $626 per household. The top ten per cent, however account for 25 per cent of the total and average $3 900.

Ploughing and sowing is said to be the busiest time of the year for 90 per cent of households with weeding also important at 23 per cent. These three activities can take place anytime from November to March depending on the rainfall pattern. Harvesting (normally in March) was mentioned by only 10 per cent. In recent years ploughing has become more of a constraint since much of it now has to be done by hand hoeing due to the deaths of draught animals during the drought. Fifty per cent of households make use of outside labour of whom 23 per cent use hired labour (paid for in money or in kind such as seed or soap) and 30 per cent use exchange labour (one farmer makes use of both). The uses to which this labour is put are shown in the following Table 10.

Table 10 *Use of non-family labour*

Use	Per cent of households	
	Hired	Exchange
Weeding	20	17
Ploughing	13	10
Harvesting	0	7

4.2 GARDENING

Gardening has been practised by 97 per cent of households but only seven per cent still have gardens today. The main water sources for gardening are shown in the following Table 11.

Table 11 *Water sources for gardens*

Source	Per cent of households 90
River bed	3
Shallow well	3
Borehole	3

In the past, water was extracted from the beds of the rivers Matedze, Mushavhutwi and Chomukura, however since the drought of 1991-92 this has not been possible, hence the demise of gardening. The only two respondent households which still have small gardens irrigate from a shallow well and a borehole respectively. Due to competing demands for labour from rainfed cropping, gardening was traditionally practised during the winter months. It began in April/May once harvesting of rainfed crops had been completed and continued until the approach of the next rainy season in August/September. Just one farmer (three per cent) preferred gardening in summer when water was more plentiful.

Table 12 *Main vegetables cultivated*

Vegetable	Per cent of households 97
Rape	97
Cabbage	97
Tomatoes	80
Covo	10
Onion	7
Okra	3

The range of vegetables grown is again limited and suggests the potential for research and extension to widen peoples' choice in the collector well garden. A majority of the garden produce is or was destined for home consumption as the following Table 13 shows.

Table 13 Main uses of garden vegetables

Vegetable	Per cent of households
part consumed/part sold	70
all or mainly home consumed	27
all or mainly sold	0

Table 14 Present garden management and labour

Persons responsible	Per cent of households:	
	Decision maker	Labour
wife/other family women	80	60
male head of house/other family men	7	-
husband and wife	10	27
All family	-	10

Women were traditionally the dominant forces in decision making in the gardens. Women also supplied most of the labour although, in comparison to other areas, men appeared to be relatively more willing to contribute in this respect.

Table 15 Main gardening problems

Problem	Per cent of households 93
Water shortage	93
Pests and diseases	57
Theft	23
Damage by domestic livestock	20

Not surprisingly, shortage of water which eventually forced the abandonment of gardening was cited as the main problem. As with the other areas studied, control of pests and diseases is a major concern as is theft. Livestock damage was attributed to inadequate brushwood fencing, though latterly an NGO offered to purchase a proper fence but by then it was too late.

4.3 HOUSEHOLD INCOMES AND EXPENDITURE

The main sources of income ranked by households are as shown in Table 16.

Table 16 *Main sources of household income*

Source	Numbers of farmers ranking:			Total points*
	First	Second	Third	
Remittances	13	-	-	39
Beer brewing	5	6	2	29
Farm produce	6	3	3	26.5
Brickmaking	4	-	-	12
Selling foodstuffs	-	3	-	6
Poultry	1	1	1	5.5
Piecework	1	1	-	5
Selling snuff	-	1	-	2
Pottery	-	1	-	2
Repairing tins	-	1	-	2

* Based on three points for first, two for second, one for third

Remittances from family members working away are said to be the most important source of income for 43 per cent of households. Rainfed cropping is also significant both in terms of direct sales of crops and through brewing and sale of beer. Brickmaking is regarded as the main source of income for 13 per cent of households while poultry and working on piece rates for others are important for one household (three per cent) each. Foodstuffs sold comprise peanut butter, dried vegetables and fruit. There is little variation in what people judge to be their main items of expenditure as Table 17 shows.

Table 17 *Main items of expenditure*

Item	Numbers of farmers ranking:			Total points*
	First	Second	Third	
Food	11	13	4	63
Clothing	10	13	7	63
School fees	8	3	2	32
Farm inputs/labour	1	-	1	4

* Based on three points for first, two for second and one for third

Opinion is more or less evenly divided as to which of clothing, food, and school fees is the major source of household expenditure. However overall the former two are the most significant since they affected almost all households whereas not all households have children going to school.

5 Institutional considerations

5.1 IMPORTANCE OF LOCAL INSTITUTIONS

The following Table 18 shows the institutions which are regarded by respondents as the most important in this collection of villages.

Table 18 Recognition of importance of local institutions

Institution	Per cent of households
Agricultural Extension Worker	73
Village Councillor	30
Kraalhead	23
VIDCO Chairman	3

The high recognition given to the Agricultural Extension Worker may again reflect the fact that, in the minds of the respondents, this survey was primarily related to irrigation and gardening.

5.2 POSITIONS OF LEADERSHIP HELD BY SAMPLE HOUSEHOLDS

The following Table 19 shows the numbers of households who have a member of the family or relative who holds a local position of responsibility.

Table 19 Local leadership positions held

Position	Per cent of households
Kraalhead	23
Community Garden vice-chairman	3
ZANU (PF) village chairman	3
Parent-Teachers Association chairman	3
None	73

At this site a relatively high percentage of households do not claim any family connections to local leaders. Of those that do, the Kraalhead is the most common and in fact the survey included two household heads who hold this position. A single respondent holds the three positions of Kraalhead, community garden vice-chairman and Parent-Teachers Association chairman.

5.3 EXPOSURE TO AGRICULTURAL EXTENSION

Thirteen per cent of households have members who have qualified as Master Farmers and a further seven per cent are currently receiving the necessary training. The extension messages which were recalled by respondents are shown in the following Table 20.

Table 20 *Recall of Extension advice*

Message	Per cent of households find of use
Contour ridges for erosion control	90
Fertilizer and manure application	20
Planting in rows	20
Avoid inter-cropping	13
Cash cropping	10
Align crop rows parallel to slope	7
De-stumping	3
Attractive homestead	3
Terracing	3
Dig toilet pit	3
Harrowing	3
Clear bush re-growth and crop residues	3

Contour ridging is again by far the most commonly recalled extension message with fertilizer application and row planting of secondary importance. Again there was no mention of advice relating to vegetables or irrigation.

5.4 EXPERIENCES OF OTHER COMMUNITY DEVELOPMENT SCHEMES

First-hand experience of community development schemes in this area appears to be limited with most of the schemes referred to in the following Table 21 only having been heard about by respondents.

Table 21 *Knowledge of other community development schemes*

Scheme	Per cent of respondents
Community garden	87
Poultry	33
Piggery	17
Beer brewing	10
Soap manufacture	10
Bakery	7
Rotating credit association	7
Cattle fattening	3
Food for Work	3

The garden schemes which most respondents had heard about are the existing collector well gardens though with these as with most other schemes they seemed to have little knowledge about how they had fared. The only on-going scheme which respondents appear to be involved in is the beer brewing co-operative. Only 17 per cent of respondents were able to offer any advice for a new scheme based on their own experiences. Of these, the main features making for a successful scheme are said to be as follows:

Table 22 Factors contributing towards successful community development

	Per cent of respondents
People must be punctual	13
People must work hard	10
People must be united	3
Cleanliness	3

6 Attitudes and expectations towards the Collector Well scheme

All respondents were aware of the scheme and are eagerly awaiting its inception with high expectations. Ninety three per cent of respondents expressed a willingness to join a community garden with only old age and distance (six kilometres) deterring the remaining two (seven per cent) respectively. The following Table 23 shows how respondents believe that garden membership should be decided upon.

Table 23 Determination of garden membership

	Determination of garden membership
Those who pay the joining fee	50
All who are interested	20
The less fortunate	10
Kraalheads and the AEW should decide	7
Members of a previous co-operative garden	7
"The community" should decide	3
The garden committee should decide	3

There was a majority in favour of an open-ended entry either to everybody who is interested or to all those who pay the joining fee ($10 or $15 were proposed). In addition, an average monthly subscription rate of $2.86 was suggested at this site. A novel concept was that the less fortunate should be give priority, these were defined as widows and/or those without a family member who is employed. Others felt that first refusal should be given to members of a previous co-operative garden which had failed due to the drying up of the Matedze river. There was little variation in suggested forms of management of the garden as the following Table 24 shows:

Table 24 *Preferred forms of garden management*

Management	Per cent of households
Garden committee and Agritex	67
Garden committee alone	33

The garden committee and Agritex are again believed to be the main forces of management. Interest in management is again high with 87 per cent of respondents expressing a wish to be involved. The following Table 25 shows the main benefits which people anticipate from the Collector Well.

Table 25 *Main expected benefits*

Benefit	Per cent of households
Opportunity to grow vegetables to eat	83
Opportunity to grow vegetables to sell	80
More reliable source of domestic water	57
Cleaner source of domestic water	47
Closer source of domestic water	40
Livestock	7

As noted earlier these communities face shortages of water for both domestic use and gardening therefore this collector well is expected to be an important source of water for both. Relatively speaking, gardening was given the higher priority since currently 93 per cent of households are unable to garden whereas all households have access to some domestic water even if it is not as much as they would wish. Nevertheless, in the event of a water shortage, people will satisfy their demands for domestic water first which might at times put pressure on the availability of water for gardening. People were slightly more willing to speculate about possible problems with the scheme although there are still more than half (53 per cent) who do not foresee any difficulties provided that members co-operate with each other. Possible problems cited by the remaining 47 per cent are shown in Table 26.

Table 26 *Possible problems*

	Per cent of respondents
Disagreements between members	13
Theft	13
Pests and diseases	10
Land	10
Breakdowns	7
Shortage of cash to buy inputs	3

No single problem was agreed to be the most likely, even the two most commonly cited ones of disagreements and theft were only mentioned by 13 per cent of respondents each. Theft was said by one respondent to be a potential problem if the well is sited within the garden.

Appendix 3: Compilation of baseline household surveys

Farms and households in six communites of Zaka District, Zimbabwe, prior to the installation of a collector wells and community gardens 1993-94

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September 1994

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Contents

1 Introduction

As part of the pilot project entitled "Small scale irrigation using collector wells", six such wells, each with a community garden, are being installed at selected sites in the communal farming areas of Zaka District, Masvingo Province, in south-eastern Zimbabwe. This is a semi-arid area classified as Natural Regions IV and V (Vincent and Thomas, 1960) and lying at an altitude of between 500 and 1 000 metres. Rainfall is low and erratic, ranging from 200 to 1 000 mm per year. Communal farmers traditionally practise rainfed cropping of drought tolerant crops and herd cattle.

A collector well is a large diameter hand dug well whose yield is enhanced by radial drilling. The project aims to improve the availability of water for rural people both for domestic use and to enable the cultivation of vegetables in community gardens. It is being implemented jointly by Agritex[1], the Lowveld Research Stations, the Institute of Hydrology (U.K.) the British Geological Survey and supported by the Overseas Development Administration of the U.K.

Baseline studies have been conducted at each of the six sites to describe social, economic and agricultural aspects of life prior to the installation of each collector well. The full reports from these are contained in Lovell et al (1994). They are intended as sources of baseline data against which future monitoring and evaluation of the project can be carried out. They are also designed to elicit people's feelings on how the project should be implemented.

This report is intended to bring together the findings from each individual survey in order to highlight the contrasts and similarities between the six locations.

2 Methodology

Each baseline study comprised a formal single visit survey of 30 randomly selected households from each site. The sites and survey dates are summarised in the following Table 1.

Table 1 Collector well sites and surveys

Site: Number	Name	Number of kraals	Number of households	Survey date
1	Muzondidya	5	232	May 93
2	Gokota	6	263	May 93
3	Dekeza	5	244	July 93
4	Nemauka	6	154	July 93
5	Mawadze	7	117	February 94
6	Matedze	5	206	May 94

[1] Department of Agricultural, Technical and Extension Services, Ministry of Lands, Agriculture and Water Development, Zimbabwe

Each survey was conducted once siting of the well had been confirmed by exploratory drilling and by an informal survey to assess the need for the project and commitment of the people. For logistical reasons these stages were spread out over one year.

3 Family sizes and labour forces

From the above Table 1 it can be seen that each well is expected to serve between 117 and 263 households. In addition the wells at Dekeza and Nemauka were sited to cater for two schools and a business centre respectively.

Average household sizes range from seven to nine persons. However, these include family members who are absent for much of the time, as considered in the following Table 2.

Table 2 Absentee rates of family members

Site	Per cent of family members away from home:					
	Men;			Women;		
	Working away	Attending school away	Total away	Working	Attending school away	Total away
Muzondidya	35	0	35	7	0	7
Gokota	28	29	57	3	12	15
Dekeza	31	18	49	7	10	17
Nemauka	32	11	43	3	7	10
Mawadze	33	17	50	7	12	21*
Matedze	39	0	39	6	4	10

* Includes 2 per cent sick

Between 35 and 60 per cent of men are away from home. Around one third from each site are working while the remainder attend school. For women the figures are lower with a relatively greater percentage who are at school rather than working. For Muzondidya, Dekeza, and Matedze the main destination for work is the lowveld (Chiredzi and Triangle sugar estate) whereas at Nemauka and Mawadze it is Harare. Migrants from Gokota head for a variety of locations throughout the country. The prolonged absences of men together with the fact that most children attend school, mean that women make up the greater part of the farm family labour forces as Table 3 shows.

Table 3 Availability of family members for full-time household, farm and garden work

Site	Men	Women	Children	Total
Muzondidya	1.6	2.1	0.2	3.9
Gokota	1.0	1.9	0	2.9
Dekeza	1.3	1.9	0	3.2
Nemauka	1.2	1.9	0	3.1
Mawadze	0.9	1.5	0.1	2.5
Matedze	1.4	2.1	0.1	3.6

At Muzondidya and Matedze households have on average the largest labour forces compared with Mawadze which has the lowest. With the exception of Mawadze the availability of female family labour is similar at all sites. There is some variability within households as the following Table 4 shows.

Table 4 Variability in composition and availability of household labour

Site	Per cent of households:		
	Headed by a woman	With no man full-time	With at least one member working away
Muzondidya	10	23	53
Gokota	3	23	47
Dekeza	3	23	60
Nemauka	20	27	47
Mawadze	17	27	43
Matedze	10	10	63

Table 4 shows that the percentages of households which are headed by women ranged from three per cent at Gokota and Dekeza to 20 per cent at Nemauka which was the only site to choose an all-women committee to run the community garden. With the exception of Matedze, approximately one quarter of households at each site are without the full-time services of a man to assist with the farming, household and gardening tasks. The importance of off-farm incomes is indicated by the fact that between 43 and 63 per cent of households have at least one family member who is away working.

4 Economic activity and wealth

4.1 HOUSEHOLD INCOME SOURCES

Households were asked to rank their top three sources of income from which the following Table 5 is constructed.

Table 5 Main sources of household income

Source	Total Points *						
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'	Average
Rainfed crops	47	38	49	35	69	26	44
Off-farm	21	49	41	35	34	44	37
Beer brewing	34	11	23	19	12	29	21
Vegetables	15	2	4	5	8	-	6
Handicrafts	4	7	-	6	6	4	4
Brick making	3	-	-	4	2	12	3

Three major sources of income for households become evident from Table 5. Sales of rainfed crops are particularly important in Mawadze and also at Muzondidya and Dekeza. The significance of rainfed cropping is further enhanced if one considers that beer brewing depends on locally grown sorghum and millet. Off-farm sources of income are more crucial in Matedze and Gokota. They refer mainly to remittances sent by family members working away and also, less commonly, to those who work locally such as schoolteachers.

4.2 HOUSEHOLD EXPENDITURE

The main items of expenditure noted by respondents are shown in the following Table 6.

Table 6 Main items of expenditure

Item	Total Points*						
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'	Average
Clothing	42	33	49	58	44	63	48
Groceries	87	84	-	-	31	63	44
School fees	40	36	33	54	59	32	42
Farm inputs/labour	2	6	5	5	18	4	7
Vegetables	-	12	-	-	-	-	

* Three points for first, two for second and one for third

The basic necessities of clothing and groceries are the dominant items reflecting the needs of low income rural communities; school fees is the only significant item which might be considered as non-traditional. The most noticeable differences between sites are the greater importance of groceries at Muzondidya and Gokota and their corresponding absence at Dekeza and Nemauka.

Vegetables are considered a minor item in comparison with more "lumpy" items of expenditure such as school fees and clothing, which require large individual outlays, and groceries which encompass a wide range of food and non-food products.

Expenditure on agricultural inputs, (most of which refers to hiring of labour) is noticeably lacking except at Mawadze.

4.3 RAINFED FARMING

4.3.1 Cropping patterns and production

All households engage in rainfed cropping; the principal form of economic activity in the area according to Table 5 above. The main crops are shown in the following Table 7.

Table 7 Cropping patterns

	Per cent of total crop areas at each site:						
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'	Average
Maize	58	46	35	61	51	39	49
Finger millet	16	31	24	30	18	15	22
Sorghum	15	7	15	-	3	18	10
Sunflower	4	4	6	4	13	6	6
Groundnut	-	2	6	5	9	12	6
Pearl millet	2	6	11	-	-	6	4
Cotton	5	4	3	-	3	4	3
Bambara nut	-	-	-	-	3	-	

Maize, the staple food is grown by between 90 and 100 per cent of farmers and occupies almost half the total cropped area. Finger millet is grown mainly for beer brewing on lower acreage than for maize but is still to be found on 70 to 90 per cent of farms. It is particularly popular in Gokota, Nemauka and Dekeza.

Sorghum and pearl millet are cultivated both for their drought tolerance and beer brewing properties. Sorghum is grown by 63 to 77 per cent per cent of farmers at all sites except Nemauka and Mawadze where it is of little importance. Pearl millet figures prominently in Dekeza, cultivated by 57 per cent of farmers.

The other crops are mainly grown for cash but on very limited areas. Sunflower is the most popular in terms of numbers of farmers; ranging from 20 per cent at Muzondidya to 60 per cent at Mawadze. This reflects its low input and labour requirements, short duration (for drought tolerance) and ready market at an attractive price. Groundnuts are more labour intensive and most commonly grown in Mawadze and Matedze (63 and 47 per cent of farmers respectively). Cotton is potentially highly remunerative but its high input requirements have restricted the numbers of farmers who are prepared to shoulder the risks to between three and ten per cent.

Table 8 Average cropped areas, grain production and gross crop incomes per household

	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
Average cropped area (ha)	1.70	1.51	1.43	2.24	2.41	2.31
Average grain production (tonnes)	1.93	2.26	1.67	2.30	3.13	1.74
Average gross income from crops (Z$)	1 825	1 860	1 561	1 962	3 623	1 591

The above Table 8 suggests that at all sites, average cropped areas are small. Gross incomes are likely to be close to net incomes since the only significant input costs are hybrid maize seed and agro-chemicals for cotton which few farmers cultivate. The resulting gross farm income per year can therefore be interpreted as the reward to the farm family for its inputs of labour which it expends in growing the crops. A figure of Z$2 130 is comparable to what might be earned from one year's work at the minimum wage rate; only at Mawadze is this figure exceeded. The figure for annual grain production gives an indication of food security which is an important consideration for households: One tonne is normally reckoned to be sufficient for one year. On this basis, all sites produce on average sufficient for at least one year's supply while at three sites there is sufficient to carry over for two or three years in the event of drought.

In terms of these three parameters of rainfed cropping, Mawadze is on average the most successful and well endowed site. Its larger cropped areas result in high maize output plus greater production of cash crops, particularly sunflower. Dekeza and Matedze appear to be the least well off, reflecting their lower maize production and areas of cash crops. There is however considerable variability within communities as Table 9 shows.

Table 9 Variability in cropped areas and gross crop incomes

	% of toal cropped areas occupied by:		% of total gross crop incomes earned by:	
	smallest 40%	largest 10%	lowest 40%	highest 10%
Muzondidya	12	25	11	34
Gokota	18	20	15	24
Dekeza	16	21	18	30
Nemauka	23	18	19	23
Mawadze	25	18	22	29
Matedze	19	21	16	25

At all sites there is inequality in the distribution of land in that the largest 10 per cent of farms operate proportionately larger areas than do the smallest 40 per cent. The situation is most extreme at Muzondidya and closest to equality at Nemauka and Mawadze. Inequality in gross incomes is more extreme reflecting the fact that this is determined not only by cropped areas but also by managerial ability and farmers' access to other resources. Again the differences are most striking at Muzondidya and less so at Mawadze and Nemauka.

4.3.2 Labour use

There is a heavy dependence on labour as a source of farm power, particularly since the losses of draught animals during recent drought years. Ploughing and sowing are said to be the main labour peaks at all sites (varying from 50 per cent of respondents at Mawadze to 90 per cent at Dekeza and Matedze). This can be carried out anytime from October to February, depending on the rains. For much of this period there is competition for labour from weeding which is also now mainly done by hand. Harvest was commonly reckoned to be a secondary peak, commencing in January and finishing by the end of May.

At five out of the six sites (the exception being Mawadze), between 40 and 50 per cent of households normally rely on family labour alone. At four of these sites, between 40 and 50 per cent of families usually hire some additional labour, while the remaining 10 per cent make use of traditional exchange labour ("nhimbe"). The latter is relatively more important at Matedze, where it is used by as much as 30 per cent of households. At Mawadze, as many as 93 per cent of households commonly use outside labour, particularly hired labour (77 per cent) mainly for weeding.

4.4 CAPITAL OWNERSHIP

4.4.1 Livestock

The main items of capital owned by farmers are livestock and implements. Livestock ownership was drastically reduced by the 1991-92 drought as the following Table 10 shows.

Table 10 Livestock ownership (number of head)

Site	Cattle		Donkeys		Sheep		Goats	
	Pre 1992	Now	Pre 1992	Now	Pre 1992	Now	Pre 1992	Now
Muzondidya	347	2	14	3	45	4	219	54
Gokota	227	10	9	9	8	7	217	74
Dekeza	219	17	4	2	12	2	212	86
Newmauka	210	20	6	0	14	2	203	90
Mawadze	300	35	14	18	56	8	326	150
Matedze	179	17	10	1	0	0	221	154

Cattle are traditionally regarded as the most important livestock and sign of wealth. Mawadze and Muzondidya reported the greatest numbers of cattle prior to the drought although the figure for Muzondidya is distorted by one kraalhead who claimed to have owned around 200 head. At the other sites, distribution of ownership was more even in that the most number of head per household ranged from 30 to 40. Matedze had the lowest numbers of cattle while the totals for Gokota, Dekeza and Nemauka were similar. Reported losses due to the drought were similar for each site, ranging from 88 per cent at Mawadze to 99 per cent at Muzondidya. Donkeys and sheep are relatively unimportant at all sites. Prior to the drought, sheep were most commonly found in Muzondidya and Mawadze. Total ownership of goats prior to the drought was similar at five sites, ranging from 200 to 220 head. Mawadze again

had the highest number at 326 head. The differences in rates of recovery between the six sites may reflect the different dates when the surveys were carried out.

There is some variation in the distribution of livestock ownership as the following Table 11 shows.

Table 11 Percentages of households owning livestock

	Cattle:		Donkeys:		Sheep:		Goats:	
	Pre 1992	Now	Pre 1992	Now	Pre 1992	Now	Pre 1992	Now
Muzondidya	63	7	7	3	23	10	77	57
Gokota	77	20	7	7	7	7	77	53
Dekeza	90	27	3	3	3	3	73	37
Namauka	83	20	7	0	7	3	77	60
Mawadze	90	47	17	20	27	10	87	27
Matedze	73	27	7	3	0	0	67	60

Prior to the drought, Mawadze had the highest rates of ownership for all livestock types and this is still the case for cattle though the rate of goat ownership declined more dramatically than at other sites and is now the lowest of all. Muzondidya recorded the lowest rates of cattle ownership both before and after the drought.

4.4.2 Implements

The main implement (after the hand hoe) is the animal drawn plough, possession of which one would expect to be linked with draught animal ownership. The following Table 12 suggests that this is the case. Ownership of animal drawn "scotch carts" is also included as an indicator of wealth.

Table 12 Implement ownership

	Percentage of households owning in:					
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
Plough	60	73	87	77	90	90
"Scotch cart"	10	23	0	20	23	3

Mawadze has the highest rates of ownership of both implements while scotch carts are scarcest in Dekeza and Matedze.

4.4.3 Housing

An immediate visual indicator of wealth is the standard of housing. The following Table 13 categorises the predominant housing styles of the respondent households.

Table 13 Housing styles

Site	Percentage of homesteads:		
	Mainly tradional	Combination	Mainly modern
Muzondidya	80	-	20
Gokota	53	20	27
Dekeza	73	20	7
Namauka	57	30	13
Mawadze	47	36	17
Matedze	64	23	23

The majority of families at each site occupy traditional style compounds of pole and dagga huts. The numbers living in more costly modern style homesteads constructed with bricks and mortar and asbestos roofs vary between the sites. Gokota has the highest percentage at 27 and Dekeza the lowest at seven.

4.5 Overall assessments of wealth

Subjective ratings were given to each respondent household based on visual observations, answers to the questionnaire and any incidental information gleaned. The ratings are summarised in the following Table 14.

Table 14 Wealth ratings

Site	Percentage of households:		
	Wealthy	Average	Less wealthy
Muzondidya	30	70*	
Gokota	7	76	17
Dekeza	0	33	67
Nemauka	0	33	67
Mawadze	20	53	27
Matedze	13	37	50

* Only two categories used

Table 14 supports earlier evidence that Mawadze is a relatively well-off community while Dekeza and Nemauka are less so.

5 Community concerns

5.1 PEOPLE'S PERCEPTIONS OF PROBLEMS

The main problems which are perceived by respondents to afflict their communities are shown in the following Table 15.

Table 15 Main community problems

Problem (all shortages of:)	Per cent of respondents in:					
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
Water	100	100	100	90	100	93
Vegetables/gardens	-	33	3	3	33	77
Draught animal power	-	3	47	93	37	73
Transport	-	-	63	43	3	-
Health care	-	-	10	-	23	-
Land	-	-	13	-	-	10

The above Table 15 indicates that water both for domestic purposes and irrigation of vegetables is the principal need for people in this semi-arid area though it is recognised that answers to this question may have been influenced by the fact that the surveys were related to a water and garden oriented project. The shortage of draught animal power stems from the severe drought of 1991-92 which caused high mortality and forced farmers to sell livestock in order to raise money.

The shortages of transport at Dekeza and Nemauka refer to the lack of bus services in their areas to connect them with the tar road and main service centres. Dekeza and Mawadze suffer from a lack of health care facilities as neither has a clinic. The relatively few respondents noting a lack of land for farming is surprising given that this is a relatively densely populated farming area with small holding sizes, but again this may be related to the nature of the survey.

5.2 Domestic water

The nature and extent of "the water problem" does vary between the different communities. The following Table 16 shows the situation regarding the availability of domestic water.

Table 16 Availability of water for domestic use

	Per cent of households in:					
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
Insufficient	50	13	7	13	80	100
Average use (Li/household/day)	130	120	120	137	124	98

Lack of reliable, clean and nearby sources of domestic water are particular problems at three sites. The problem is universal at Matedze where the average daily consumption per household is low relative to the other sites. At Mawadze the problem is related to a well which has been unusable since May 1993 when the pump was removed for repair by the DDF. Since then people rely on shallow wells dug into the vlei during summer, however these dry up during the latter part of the dry season (August to October) and are regarded as unhygienic. The alternatives are distant or low yielding boreholes. At Muzondidya half of the respondents report a general lack of boreholes with 13 per cent regarding even the nearest as being "far" from their homesteads.

At the other three sites domestic water is less of a problem although again there are those who would appreciate closer sources (13, 13 and 20 per cent respectively at Gokota, Nemauka and Dekeza). A further 13 per cent at Gokota report that existing boreholes are prone to breakdowns.

5.3 CURRENT GARDENING ACTIVITIES

5.3.1 Extent of gardening

Irrigated gardening, mainly during the winter, is a widespread tradition in the area with between 87 and 100 per cent of respondent households having practised it at some time. However, as the following Table 17 shows, lesser numbers are still able to do so nowadays.

Table 17 Present gardening experience

	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
Still gardening	87	97	73	70	97	7
No longer gardening	-	3	20	30	3	90

The situation is most serious at Matedze where extraction of irrigation water from river beds has not been possible since the drought of 1991-92. Significant numbers have also given up gardening at Nemauka due to legislation prohibiting cultivation along the banks of streams from where they used to obtain water. A combination of these two constraints was said to underlie the abandonment of gardening by households in Dekeza.

It should also be noted that many of those who still practise gardening are restricted to small areas by shortages of water. This is supported by the fact that the majority of gardens (ranging from 53 per cent at Gokota to 83 per cent at Nemauka) produce mainly for home consumption. To a great extent this explains the high percentages of respondents who later express a willingness to join a new community garden.

Production of vegetables for sale is most prevalent at Gokota and Mawadze where 43 and 40 per cent respectively of gardens are said to produce partly for the market. These sites together with Dekeza (where the corresponding figure is 33 per cent) have the advantage of relatively good existing water sources and community gardens. However, even at Muzondidya and (in the past) Matedze the figures were as high as 30 and 27 per cent respectively. This suggest that people are willing and able to sell vegetables if water is available.

5.3.2 Water sources for gardening

The relative importance of different water sources for gardens past and present is shown in the following Table 18 (some gardens used a combination of sources).

Table 18 Water sources for gardens

	Per cent of households in:					
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
River bed	40	17	50	76	-	90
Shallow wells	43	53	3	23	47	3
Borehole	3	43	50	3	-	3
Small dam	-	3	-	-	70	-

At Muzondidya, Nemauka and (in the past) Matedze most gardens were irrigated from shallow wells dug into the vleis and/or river beds. Matedze was able to support a community garden while Nemauka still does, although being close to a river bank, its future is in doubt. At a further two sites (Dekeza and Gokota) these two sources are also important but in addition these places have boreholes which support community gardens. At Mawadze many households make use of shallow wells and have access to a small dam three to six kilometres distant which supports a community garden of 3.6 hectares.

5.3.3 Seasonality of gardening

Given the availability of water, gardening is traditionally practised during winter, beginning in May, once the harvest of rainfed crops is complete and ending with the commencement of land preparation for the next rainfed season in August/September. The main reason why the season is restricted is reported to be the shortage of labour during summer due to the demands of rainfed cropping. Furthermore, at this time vegetables are available from rainfed fields and the wild. It is also the case that pests and diseases are more prevalent during the summer while the availability of water in river beds and shallow wells is at its greatest in the months following the end of the rainy season.

However, at each of three sites (Muzondidya, Gokota and Nemauka) 17 per cent of households continue to garden throughout the year while at Mawadze the numbers are even greater (27 per cent). Mawadze is also unusual in that 20 per cent of households are said to garden only during the summer months; these families have no plots by the dam but instead rely on shallow wells which dry up during the winter.

5.3.4 Vegetables grown

At all existing gardens the range of vegetables grown is limited with rape being the most popular followed by tomatoes and cabbages (harvested for their leaves). Onions are also important at Mawadze (grown by 43 per cent of gardens) and are grown by a few gardeners at the other sites (Muzondidya excepted) as is covo.

5.3.5 Management and labour

Traditionally the management of gardens is a female occupation as the following Table 19 shows.

Table 19 Past and present garden management

	Percentage of respondents who work gardens managed by:					
	Women only	Women & men	Men only	Extension worker	Garden chairman	Co-op
Muzondidya	60	3	10	-	-	3
Gokota	87	3	7	-	-	-
Dekeza	27	20	20	20	7	-
Nemauka	50	23	17	-	10	-
Mawadze	30	10	70	63	3	-
Matedze	80	10	7	-	-	-

At only two sites, Dekeza and Mawadze are women of lesser importance. Both these sites have community gardens which are regarded as being managed by Agritex through the local Extension Worker with the garden chairmen apparently having less of an influence.

There was less variation between the sites in the main contributors of labour to existing gardens. Between 60 (at Muzondidya and Matedze) and 90 per cent (at Gokota) of households had gardens where women supplied all or most of the labour. By contrast no more than seven per cent had gardens where men did all the work.

5.3.6 Gardening problems

The main problems encountered in previous and existing gardens are shown in the following Table 20.

Table 20 Main gardening problems

Problem	Per cent of households in:					
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
Pests & diseases	73	93	90	90	90	57
Water shortage	40	90	57	63	33	93
Theft	47	33	43	30	50	23
Damage by livestock	-	-	3	10	17	20

Pests and diseases are regarded as the major problems at all sites except Matedze where they rank second behind the water shortage which finally prevented gardening there. Shortage of water is also significant at other sites, in particular Gokota, though less so at Mawadze. At

the latter site the problem only exists for those who are dependent on shallow wells since the small dam is said never to have failed. At Mawadze, distance to the dam is more of problem for 30 per cent of respondents who face round trips of between six and 12 kilometres. Theft is prevalent at all sites, particularly at Mawadze, where the distance may be a contributing factor. Damage by domestic livestock is a problem where gardens are not adequately fenced.

Minor problems mentioned by between three and ten per cent of respondents at some sites comprised shortages of seed, fertilizers and implements and marketing. The latter referred to one occasion at Mawadze but may become more of a problem if vegetable production is dramatically increased.

5.4 VEGETABLE CONSUMPTION

The existing patterns of consumption and supply of fresh vegetables are shown in the following Tables 21 and 22.

Table 21 Frequency of fresh vegetable consumption

Site	Per cent of households consuming		
	Mainly during summer	All or mostly year-round	Rarely
Muzondidya	74	13	13
Gokota	97	3	-
Dekeza	70	30	-
Nemauka	80	20	-
Mawadze	74	26	-
Matedze	100	-	-

Table 22 Main sources of fresh vegetables

Site	Per cent of households obtaining vegetables from:			
	Rainfed fields	The wild	Own gardens	Purchased
Muzondidya	87	30	23	66
Gokota	100	55	20	90
Dekeza	100	40	57	37
Nemauka	93	-	33	37
Mawadze	97	-	67	50
Matedze	100	-	3	100

The majority of households at each site consume fresh vegetables during the summer rainy season from October to April. This reflects the most common sources of supply which are the rainfed arable fields where farmers inter-crop cereals with a range of cucurbits from which both fruit and leaves are consumed. Also practised at this time is the gathering of wild vegetables though this is only rated of importance at three sites (Muzondidya, Gokota and Dekeza).

Relatively few households consume fresh vegetables throughout the year, with Gokota and Matedze being particularly needy in this respect together with the 13 per cent of households at Muzondidya who are said to rarely consume vegetables at any time.Purchased vegetables are major sources of supply at Matedze and Gokota and to lesser extent at Muzondidya and Mawadze. When evaluating the full economic impact of the project it will be necessary to determine the impact of the new community gardens on the viability of existing gardens which at present sell vegetables to these communities.

The desperate situation at Matedze and to lesser extent at Gokota and Muzondidya is further demonstrated by the low percentages of households who can depend on their own gardens.

There was general agreement that the main period of scarcity for fresh vegetables is the dry season; from May/June to September/October. During this time a majority of households at each site consume dried vegetables. It is envisaged that the collector well can help fill this gap by enabling winter production of vegetables from community gardens.

5.5 HEALTH

Table 23 below shows the main health problems which were cited by respondents

Table 23 Health problems

Site	Per cent of households:		
	Malaria	Stomach aches	None
Muzondidya	80	93	3
Gokota	80	27	10
Dekeza	97	7	3
Newmauka	90	3	7
Matadze	73	47	7
Matedze	37	3	60

Malaria was most frequently mentioned and is associated with mosquitoes and the onset of the rains. At Matedze malaria and ill health in general seems to be viewed as less of a problem than at the other sites. The reference to stomach aches has different interpretations. At Mawadze it was put down to the use of unclean domestic water drawn from shallow uncovered wells (40 per cent of households) or to inadequate sanitation (seven per cent). At this site the potential benefit of a clean source of potable water appears to be great. At the other sites (particularly Muzondidya and Gokota) however the malady is associated with over eating of green maize around harvest time.

6 Institutional considerations

6.1 IMPORTANCE OF LOCAL INSTITUTIONS

For any development scheme to succeed it is necessary to identify local leaders and have their support. Table 24 below reveals some differences in the importance which people attach to different institutions both between and within sites. The reasons probably reflect both the

strengths of individual characters holding the posts at different sites and the esteem in which they are held as well as longstanding allegiances within communities.

Table 24 Recognition of importance of local institutions

Institution	Per cent of households in:					
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
Extension worker	20	3	80	77	90	73
Village councillor	43	3	27	20	13	30
VIDCO Chairman	40	60	-	13	13	3
Kraalhead	23	37	-	10	3	23
Headman (Chief)	-	-	13	-	-	-
Headmaster	3	-	-	-	-	-

At four sites, Dekeza, Nemauka, Mawadze and Matedze, the Agricultural Extension Worker (AEW) is regarded as the most important local figure. This probably reflects Agritex's role in managing existing gardens and irrigation schemes.

The VIDCO chairman is regarded as more important at the remaining two sites though at Muzondidya the Councillor is held in similarly high regard. At Gokota initial progress on the garden was held up by a dispute between the VIDCO chairman and a Kraalhead (both of whom have strong followings according to Table 24) while the AEW (who receives a low vote) was said not to be very active at the time. Overall, traditional leaders (Kraalheads and Headmen) seem to be regarded as less important than the more modern institutions.

6.2 EXPOSURE TO AGRICULTURAL EXTENSION

The following Table 25 shows little variation between the sites in the percentages of respondents who have qualified as Master Farmers while few families have members who have received any other agricultural training.

Table 25 Agricultural training and qualifications

	Percentage of household in:					
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
Master Farmers	10	17	17	17	13	13
Trainee Master Farmers	23	30	-	10	20	7
Other agricultural training	10	3	7	3	7	-

There is however more variation in the numbers who are undergoing Master Farmer training, ranging from 30 per cent at Gokota to nil from the sample at Dekeza. Table 26 below summarises the most commonly recalled extension messages.

Table 26 Recall of Extension advice

Message	Per cent of households:					
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
Contour bunds	77	97	93	90	87	90
Fertilizer application	40	23	57	40	50	20
Planting in rows	-	-	37	30	47	20
Crop rotation	3	-	-	-	30	-
Attractive homespread	3	20	-	-	3	3
Vegetable cultivation	-	-	3	7	-	-
Nothing	7	-	7	-	-	-

The three most frequently recalled extension messages all relate to rainfed cropping. Mawadze seems to be the place where extension has made the biggest impact with numerous other messages being referred to by respondents in addition to the above. Very few respondents claim not to have learnt anything from extension. However it was noted that very little advice seems to have been absorbed on the subject of vegetable cultivation and no mention was made of irrigation.

6.3 EXPERIENCES OF OTHER COMMUNITY DEVELOPMENT SCHEMES

Table 27 lists the schemes most commonly referred to by respondents.

Table 27 Knowledge of other community development schemes

Scheme	Per cent of respondents in:					
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
Feeding scheme	97	77	100	77	7	-
Food for work	57	53	23	57	17	3
Cmmunity garden	-	-	17	-	63	87
Other schemes	-	-	-	-	90	50
None	-	3	-	7	3	-

At four sites, Muzondidya, Gokota, Dekeza and Nemauka, most respondents are aware of the Feeding Scheme for children and, to lesser extent, the Food for Work programme, both of which were initiated in response to the drought of 1991-92. However apart from a minority of respondents at Dekeza who have experience of community gardening, no other schemes were referred to at any of these sites.

At Matedze and Mawadze little mention was made of the drought recovery programmes but many more respondents are aware of community garden schemes. They were also able to list many other schemes ranging from grinding mills to sewing, soap making, beer brewing and keeping of various livestock. At Matedze the knowledge was mainly hearsay whereas at Mawadze most respondents had actively participated in one or more of these enterprises and were able to offer extensive advice on factors making for their success or failure such as the

need for technical competence, a reliable committee and good planning.

At each of three sites, Mawadze, Muzondidya and Gokota, 83 per cent of respondents felt that they had learnt something from these schemes which would be of relevance in a future community gardening scheme, compared with 57 and 47 per cent respectively at Nemauka and Dekeza and just 17 per cent at Matedze. The most commonly mentioned factors revolved around the need for project members to be united, hard working and punctual.

7 Attitudes and expectations towards the Collector Well schemes

7.1 AWARENESS AND WILLINGNESS TO JOIN

All respondents are aware of the schemes and are eagerly awaiting their inception. At all sites between 80 and 100 per cent of respondents expressed a willingness to join the community gardens; old age followed by distance to the well were cited as the main reasons deterring those who do not wish to join.

7.2 EXPECTED BENEFITS

Table 28 sets out the most important benefits which respondents are anticipating from the project.

Table 28 Main expected benefits

Benefit	Per cent of households in:					
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
Vegetables to eat	83	87	90	97	30	83
Vegetables to sell	80	73	90	97	17	80
Cleaner domestic water	76	50	60	60	77	47
More reliable domestic water	70	63	37	53	80	57
Closer domestic water	40	47	30	47	47	40
Livestock	40	33	27	57	-	7

The opportunity to grow vegetables, both for home consumption and sale is the most important expected benefit at five out of the six sites. The exception is Mawadze where a small dam and associated gardens mean that vegetables are a lesser priority. Of more relevance to peoples' needs at this site is a reliable and clean source of domestic water since shallow wells are easily contaminated and dry up while the existing DDF well has been unusable since May 1993 due to a broken pump. At Gokota and Muzondidya, reliability of domestic supply is an important consideration due to previous breakdowns whereas at Dekeza it is less so since existing boreholes are said to be reliable. Cleaner water is in demand at Dekeza and Nemauka to replace that drawn from shallow wells in riverbeds. Closeness of

supply for domestic purposes is of relatively little importance at all sites; a possible disadvantage of opting for a single high yielding water source as opposed to several lower yielding dispersed points. Water for livestock is also rated lowly since there are few livestock at present and increased ownership is more constrained by a lack of money than by availability of water.

7.3 DETERMINATION OF GARDEN MEMBERSHIP

The preferred criteria for deciding on membership of the garden at each site are given in the following Table 29.

Table 29 Determination of garden membership

	Per cent of households in:					
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
Kraalheads	37	73	40	23	-	7
VIDCO chairman	27	33	-	33	-	-
Extension worker	3	-	63	53	-	7
Garden committee	24	7	-	-	-	-
"The community"	27	7	7	10	3	3
Payment of joining fee	-	-	-	-	77	50
All interested	-	-	-	-	17	20
Labour contribution	-	-	-	-	13	-

There are marked differences between the sites. Respondents at Muzondidya, Gokota, Dekeza and Nemauka prefer that village leaders should decide who should join: the Kraalheads are the most commonly cited people for this task, particularly at Gokota. At Nemauka and Dekeza however, it is advocated that Agricultural Extension Workers should have the greatest prominence. The VIDCO chairmen are expected to play a part at three sites, though at Gokota (as discussed earlier), this has lead to conflict. The Garden committee is deemed to be relatively unimportant in taking these decisions as one might expect since such a body is normally chosen by the members rather than vice versa. However at Muzondidya it was noticeable that a committee had been appointed well before membership had been decided upon (and even before digging of the well had commenced!).

A minority of respondents at each site (with most at Muzondidya) advocate a more consensus based approach whereby "the community" decides who the most suitable members should be. The exact mechanisms by which these choices are made was not elaborated upon but should be followed up once this has been done. At Mawadze and Matedze, payment of the joining fee is emphasised as the main criterion. This has the advantage of avoiding any discontent arising from charges of favouritism where others make the decision but may exclude the poorest members of society. Perhaps to overcome the latter possibility, there are minorities of respondents at both these sites who advocate membership open to all who are interested. A more practical compromise may be to admit those families who contribute labour during the construction phase, although this was only favoured by 13 per cent of respondents at

Mawadze. A further 10 per cent at Mawadze believe that "the needy" (defined as widows and those families without a regular wage earner) should be given priority.

7.4 MANAGEMENT

The main options which are suggested for the management of schemes are set out in the following Table 30.

Table 30 Preferred froms of garden management

	Per cent of households in:					
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
Garden committee and Agritex	21	74	83	80	40	67
Garden Committee alone	40	16	10	13	30	33
Agritex alone	33	10	7	3	23	-

At all locations except Muzondidya and less so at Mawadze it is most commonly believed that schemes should be jointly managed by the garden committees and Agritex in the form of the Extension Workers. At Muzondidya relatively greater importance is assigned to one or the other working alone. It was encouraging to note that at five out of the six sites, between 80 and 90 per cent of respondents expressed a willingness to become involved in management themselves. At Mawadze, where the greatest numbers of respondents have first hand experience of community development schemes, the figure was slightly lower at 67 per cent which perhaps suggests a greater appreciation of the pressures of management.

7.5 WILLINGNESS TO PAY FOR REPAIRS AND MAINTENANCE

There was some variation in the average amounts which respondents are willing to contribute monthly towards repairs and maintenance of the well and garden as the following Table 31 shows.

Table 31 Average suggested subscriptions (Z$ per month)

Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
1.42	1.61	6.08	3.37	2.86	2.86

The highest amounts were offered at Dekeza and the lowest at Muzondidya and Gokota. However, given the large numbers of people who are expected to join the gardens, even the lower amounts should be adequate. For example 100 members contributing $1.42 per month would raise Z$1 704 per year; enough to replace one pump cylinder if necessary. It will be interesting to compare these amounts with what is actually collected.

7.6 ANTICIPATED PROBLEMS

Table 32 below suggests that respondents are reticent about anticipating any difficulties.

Table 32 Possible problems

	Per cent of respondents in:					
	Muz'	Gok'	Dek'	Nem'	Maw'	Mat'
No problems expected	57	100	94	97	57	53
Breakdowns	30	-	-	-	13	7
Disagreements between members	3	-	-	3	20	13
Pests and diseases	17	-	-	-	3	10
Shortage of cash to buy inputs	13	-	-	-	3	3
Theft	-	-	-	-	3	13
Labour shortage	10	-	-	-	3	-
Shortage of land	-	-	3	-	-	10
Shortage of water	-	-	3	-	-	-
Marketing	-	-	-	-	-	3

Respondents in Gokota, Dekeza and Nemauka are especially reluctant to foresee any setbacks possibly due to a fear that the project might consequently be withdrawn. At each of the other sites between 50 and 60 per cent of respondents are similarly unforthcoming. Otherwise, the most commonly mentioned potential problems are breakdowns (particularly at Muzondidya), disagreements between members (at Mawadze) and pests and diseases (at Muzondidya).

8 Summary and conclusions

Individual baseline surveys have supplied data on social and economic aspects of life in six communities which are each to receive a collector well and community garden, and have revealed peoples' expectations of the project. This information can be used in monitoring and evaluating the impacts of the projects on the communities concerned and in drawing lessons for the design and implementation of future schemes.

Collation of the findings from the six surveys highlights a number of parameters which vary between the sites and which should be taken into account when comparing the performances of the different schemes. These are:

- Shortage of water is the principal problem reported by respondents at all sites. At Mawadze the priority is for a cleaner and more reliable source of domestic water and closer gardens. At the other sites there is a need to grow more vegetables both for home consumption and for sale since current production is constrained by shortages of water, most acute at Matedze. Secondary needs are for more reliable sources of domestic water at Muzondidya and Gokota and cleaner water at Dekeza and Nemauka.

- The total populations which are expected to be within reach of the collector wells vary from 117 households at Mawadze to 263 at Gokota. The numbers joining the community gardens will be less than this and vary from approximately 50 members

at Dekeza to 130 at Muzondidya and Gokota. The performances of gardens with large and small memberships should be compared in terms of their output and the extent to which non-members benefit. It will be necessary to compare the social and economic circumstances of members and non-members in terms of their access to land, labour, capital, local leaders and agricultural extension to determine whether particular groups are being favoured or excluded. The criteria for selection of garden members will need to be referred to since different methods are favoured at different sites ranging from payment of a joining fee at Mawadze and Matedze to selection by village leaders or extension workers at the other sites.

- The availability of labour depends on the numbers of male family members who are absent (varying from 57 per cent at Gokota to 35 per cent at Muzondidya) and the extent to which hired labour is used. The latter is most commonly employed at Mawadze which has the lowest average size of family labour force at 2.5 persons (compared to 3.9 at Muzondidya). The other sites depend mainly on family labour with exchange labour also being of importance at Matedze. The main labour peaks arise from the demands of rainfed cropping.

- There are differences in wealth between and within sites as revealed by indicators such as ownership of livestock, implements and modern housing, areas of rainfed crops and the gross incomes earned from them. On all of these criteria, except housing, Mawadze appears to be the wealthiest and also, together with Nemauka, has the most equal distribution of both incomes from rainfed cropping and land.

- There are variations both between and within communities on the extent to which people have participated in or have knowledge of previous community development schemes and the lessons which have been learnt from them. Mawadze has the greatest such experience, encompassing both community gardening and a host of other schemes. Given Mawadze's relative affluence, this suggests the potential for such schemes to increase rural living standards. It may also be significant that Mawadze is the community which has the highest percentage of households where no members are away working.

- At all sites there is a tradition of gardening and a demand for vegetables upon which the collector wells and community gardens are aiming to build. However the extent and types of existing gardens and hence patterns of vegetable supply, consumption and marketing vary according to the availability of irrigation water from community boreholes, shallow wells, riverbeds and small dams. At present, Mawadze is the most well endowed although the gardens are at a distance of up to six kilometres away. At the other sites existing gardens are said to be too small due to the shortage of water; the situation is worst at Matedze where 90 per cent of respondents are unable to garden at all for this reason.

- Women supply most of the labour for all existing gardens and management where they are privately owned. However women tend to be less involved in the management of community gardens (at Dekeza and Mawadze) where men and the Agricultural Extension Workers assume the major roles. The net effects of the schemes on women will depend on the balance between the extra work which the schemes demand of women, the distribution of the benefits and any opportunity cost in terms of other activities which may need to be compromised such as rainfed cropping or off-farm activities.

- The institutions and local leaders who people regard as influential vary between different locations and, in some cases, within the same community. At each future scheme these will need to be identified.

- The experiences of existing community and private gardens and gaps in peoples' knowledge suggest that the priorities for extension should include pest and disease control, pump repair and maintenance, the need to raise money to purchase inputs, and water saving irrigation methods.

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Appendix 4: Meetings with groups of women

Meetings were held on different dates with groups of women at each of the six collector well gardens. The facilitators at Muzondidya and Gokota were Ms. M. Murata[1] and Miss C. Chigerwe[3], at Mawadze and Nemauku it was Ms M. Murata alone, and at Dekeza and Matedze it was Ms M. Murata and Miss T. Marimbe[2].

Topics discussed included gender issues, division of labour, health, general household budget, nutrition, vegetable consumption and attitudes/perceptions of the collector well community garden.

At all meetings, the facilitators managed to generate some lively discussions with the women, although there always tended to be some dominating characters in the groups. A list of participants from the six sites is given in Annex 1.

Gender Issues

Contributions to decision making vary, be it within the family or within the community, but the general consensus was that men do most of the decision making. The most common reasons cited were that:-

- Most men do not recognise women as their equals, therefore expect their wives to be subservient. Tradition also demands that women be subservient and give room to men to make the decisions, in other words payment of lobola gives men the right to be the decision makers in their homes.

- Women sometimes look down upon and despise each other such that they cannot work together amicably. There is no unity among women, therefore they cannot stand up to fight for a single cause. Very few women are willing to follow instructions from another woman in a leadership position even if they are the ones who elected that woman into power.

- Some women are not willing to accept responsibility, the reasons being lack of confidence, fear of intimidation by men, fear of inciting hatred, gossip, jealousy and witchcraft. The elderly women cited lack of education as the major reason why women do not want to be leaders.

The women said that a woman's place in society is very clear cut. A woman's job is to look after her family, home and fields. Only on rare occasions do you find a woman permitted by her husband to work or do things outside her home. Some men do not permit women even to go out and sell garden produce or handcrafts by the roadside.

Some women mentioned the feeling of insecurity in their marriages, the main reason being that divorce can take place any time. This was a debatable issue which was vehemently denied by others, and was said to depend on age if ever the feeling arises. An elderly woman with five children or more feels that she is secure because of the presence of children and only worries if she has not produced a son.

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Most women do not entertain the question of equal rights because they feel that men will always consider themselves to be superior to females, and there is no hope for change in attitude.

Division of Labour

Division of labour varies with individuals. In some households, decisions are made together by husband and wife while in some cases the husband makes the decisions, even if he is away working in town. If decisions are made together, planning is normally done in winter after harvesting. The majority of women with husbands working away claimed that they (women) make all the decisions but consult their husbands prior to performing the tasks concerned. Widows and those women separated from their husbands make their own decisions although they sometimes consult male relatives whenever the need arises. Execution of rainfed farming and gardening tasks are mainly the woman's responsibility. The major rainfed task that the majority of men participate in is ploughing. The rest of the tasks are carried out by the women and children.

The women claimed that men only like working in the fields early in the mornings. Once they break for breakfast, they seldom want to go back to the fields, instead preferring to go beer drinking or even sitting at home but still expecting the woman to prepare lunch and supper in time. Sometimes the woman has to pass through the bush collecting firewood and/or indigenous vegetables, only to find the man impatient for his lunch already and demanding better relish than the collected vegetables!

The women complained that when it comes to physical work, men push women to be on the forefront but when it comes to selling the produce, especially rainfed, men are on the forefront and in control of all the money. Women are allowed to control money from vegetable sales because the amount is relatively small, moreover it is already destined for purchasing of grocery items like salt, sugar, soap and milling.

Gardening is the woman's responsibility since she is responsible for providing relish. All the women agreed that in the garden, which was dubbed the "mother's kitchen", women are the decision makers. Men only help with fencing and repairs. It was also alleged that men take an interest in the garden when the vegetables are ready for consumption because they know that any surpluses are sold and they can get money for a mug of beer. Thus at harvest time men are seen to be helping with watering the vegetables.

Almost all of the day to day tasks like fetching of water and firewood, child care, cooking, cleaning, shopping, watering animals etc are done mostly by women. Those with elder daughters share some of these chores while those without have to cope on their own. Most of these tasks like cooking, washing dishes and laundry are considered feminine jobs and the women maintained that a man would rather travel a long distance to go and ask a female relative (normally girls) to come and help if his wife is indisposed. However, nowadays it is difficult to get this help because the girls are at school or working.

Some women felt that carrying out all these operations is paying due to their husbands who have paid lobola for them. Some will not even imagine their husbands carrying out a task like going to the grinding mill because the husband will lose respect in society. Time is not sufficient for the women to carry out all these tasks, and those who can afford it will use hired help (mostly school-dropouts) to look after cattle and do other tasks. Others are helped by their children before and after school as well as during school holidays. The women were

suggesting that if men could help with herding cattle, then they could manage. They alleged that after all, herding cattle is traditionally a man's job but nowadays men are not inclined to do that because they will not have the opportunity to go beer drinking. Herding cattle is normally done between November and May when rainfed crops are in the fields, so time is not always sufficient to carry out other tasks like planting, weeding and harvesting. The women have no rest period throughout the year because they will be busy carrying out the following operations:-

Ploughing and planting	- October to January
Weeding	- December to March
Harvesting	- March to June
Processing and Storing	- June to August
Gardening	- April to November
Herding cattle	- November to May

Sometimes men help in some of these operations, but most of the work is done by the women and children. Some of the problems faced in the execution of these tasks include lack of draught power, insufficient seed and tools and overlap of operations which leads to shortage of labour.

The women were asked to describe their day to day tasks in Winter and in Summer. A typical work day is as follows:-

Summer:

- Wake up at 3.45 am and walk to the fields.
- Ploughing from 4.00 to 10.00 am.
- Sowing up to 12.00 noon.
- 12.00 to 1.00 pm return home, wash dishes from the previous night, prepare and eat lunch and wash dishes.
- 1.00 to 2.00 pm fetch water and walk back to the fields.
- 2.00 to 5.00 pm back to work in the fields.
- 5.00 Collect firewood on the way home.
- 6.00 Return home and bathe.
- 6.30 Prepare supper for the family and eat.
- 7.30 Wash children and dishes.
- 8.30 Go to sleep.

There are variations depending on the household. Those with children of school going age would rather finish all the household chores and prepare breakfast for themselves and the school kids first before going to the fields. Then they will not have to worry about coming back home to prepare lunch for the children. The time spent in the fields also varies with individuals, but on average women spend ten hours or more working in the fields every working day.

Winter:

Morning

- Wake up at 6.00 and sweep the compound.
- Clean the house and prepare breakfast.
- Wash dishes and fetch water.
- Crocheting, knitting, making clay pots or engaging in any other activities

Afternoon

- Prepare lunch and wash dishes
- Working in the garden
- Fetching firewood

Evening

- Prepare supper.
- Wash dishes, children and herself.
- 7.00 to bed.

Health

Women go to nearby clinics viz. Chivamba, Mushava, Siyawareva and Nemauku where medication is free for the unemployed and those earning the Government stipulated minimum wage or less. A letter from the local Councillor is all the verification needed to enable one to claim free medication.

The services women get from the clinics were said to be satisfactory despite a constant shortage of some drugs. This shortage often results in people being referred to St Anthony's hospital, which is an inconvenience for those who cannot afford the busfare. **The other general complaint was that the price of family planning tablets has gone up, therefore the majority cannot afford them.** Women raised fears that since most of them are staying with their husbands at home, child spacing is going to be difficult.

The women at Dekeza complained about the prevalence of bilharzia and scabs in the area and the lack of medicine at the local clinics for their treatment. They also pointed out that both clinics (Mushava and Chivamba) are too far, about 12 km away. If a woman is far in her pregnancy or if someone is critically ill, getting to the clinic becomes a nightmare because there are no buses. Some women in the communities volunteered to go for training on how to deliver babies and how to take care of fontanelle problems at nearby clinics. These women give free assistance to others from the community.

The general consensus was that the health status of some children and adults is not satisfactory because the diets are poor, the main reasons stated being lack of grain legumes like beans, cowpeas and groundnuts to provide proteins coupled with the unaffordability of the basic complements necessary for vegetable preparation. Some attempted to grow cowpeas but they were attacked by pests while most could not grow beans, bambara nuts and groundnuts because they had no seed. Some women also pointed out that some of the men

are heavy drinkers who do not care about providing for their families at all. Cases of kwashiorkor had been reported among children and some adults as well.

Village Community Workers (VCW's) in all areas except Muzondidya were said to be doing a great job in promoting hygienic standards. Their duties include teaching women basic hygienic practices, child care, food preparation, family planning methods, encouraging pregnant women to visit clinics for checkups, encouraging income-generating ventures etc. The major problems encountered in their endeavours include:-

- Lack of transport (bicycles) to travel around the villages. They were promised bicycles by National Affairs more than a year ago but these have not come yet.

- Lack of body building foods like bambarra nuts, peanut butter, cowpeas etc within the communities. So, although the VCW's urge women to give their children these foods, most women do not have them to give.

Common problems affecting people in the communities are:-

(a) Shortage of clean drinking water, even for some families whose homesteads are too far away from the new scheme. As a result, these people still drink water from unprotected sources.

(b) Lack of toilets because cement is costly, around $40.00 per packet. This leads to contamination of wells by human waste.

General Household Budget

The main source of income is rainfed agriculture, the main cash bringing crops being cotton, groundnuts (if sold to individuals), sunflower and maize. There is also a substantial income from sale of garden produce. Normally, money generated from sale of rainfed produce is used to take care of the larger items of expenditure like school fees, clothing, blankets, tools, utensils etc. Money generated from sale of garden produce is mainly used to buy small items like salt, sugar, paraffin, soap, dried kapenta, milling, matches etc. on a regular basis. Decisions on how to make and how to use the income can be made by husband and wife, but how much to use becomes the man's prerogative. Women are responsible for ensuring that the money they have been allocated suffices for all their needs. If a woman complains that money allocated is not enough, she is often told that she cannot budget!

The women also make a cash income out of a variety of strategies, the most common being sale of handicrafts (crocheting, knitting, and embroidery), pottery, beer brewing, labouring on other people's fields, collecting thatching grass from the nearby ranches and selling it at $3.00 a bundle, sale of brooms for sweeping the compounds, bharoni(collective savings groups) etc.

Beer brewing co-operatives (ZADO) have become very fashionable and successful these days. What happens is that ZADO members take turns to brew beer at their homesteads. The beer must be ready for drinking on a day when people of the area are not working, normally on a Wednesday or on a Sunday or the first day of the month. All the ZADO members come to drink and pay $3.20 each (contributions) to the owner of the beer. They then pay $1.20 each for three litres of beer. The quantity of beer payed for by the ZADO members is then

measured and set aside for them. They then go and sit aside to enjoy their beer together. If they do not finish the beer, they can come back the following day to continue drinking. Non-members are never allowed to sit anywhere near the members.

Brooms for sweeping the compounds are shrubs which grow wild in the bush. These are collected and sent off to Harare where the women can either sell them for cash or exchange with second hand clothes. They claimed that their husbands are now in possession of second hand suits because of those brooms.

Bharoni are collective savings groups where group members contribute the stipulated amount per month and then take turns to receive the money contributed each month. The contributions per member vary between $5.00 and $20.00 or even more, depending on the wealth status of the members.

The major items of expenditure in order of priority are:-

- education
- groceries
- clothing
- seed
- tools and chemicals

The women complained about the rising cost of living and said that they are at a loss now on how to cope. They said that their wares are now fetching low prices because other women are also selling the same produce. Beer brewing does not always pay, because the men always insist on testing it before they buy, plus the owner of the beer has to give a substantial amount to her friends who will have helped her fetch water and firewood as well as brewing the beer. As a result, little is left for sale, and if it turns sour, then nobody will buy it. Before the drought, women could sell their chickens or goats in order to raise money for school fees, but that is no longer possible.

The women mentioned that before the drought they used to have viable ventures like poultry projects and co-operative gardens. Some have been involved in dressmaking, cookery, embroidery, knitting and pottery. While it is true that some of these projects discontinued because of the drought, other reasons also contributed to the failure of some. Some women had negative attitudes towards sewing clubs because either the joining fee was not affordable, or they felt that sewing school uniforms alone was not a profitable venture. Some clubs were said to have discontinued because of poor attendance, poor leadership, lack of interest as well as lack of co-operation between members. Women at Matedze never had any other clubs besides a poultry project and the reasons mentioned were lack of knowledge, not listening to each other and lack of interest.

Overall, new attempts are being made to restart income generating projects and the women feel that the collector well garden is a good start. Income generated from there will be used as capital to start other projects. The women of Dekeza are engaged in other income generating projects which include a sewing club (ten members), crafts (ten members) and a grinding mill (45 members) which is one month old. Some of the garden members are also members of these clubs.

Vegetable Consumption

The indications were that the diet is generally poor and the relish is mainly based on indigenous vegetables. About 75% of these indigenous species are consumed between October and March while the remainder are consumed during the period when nurseries for garden vegetables are being raised, ie between March and April. Those that can be preserved by drying are later consumed during the winter period. Garden vegetables are normally consumed between May and September.

The range of edible indigenous vegetables mentioned at each meeting depended on the size of the group as well as the wealth status of the participants. Those who considered themselves to be well off would only acknowledge eating those species that are grown in the fields namely, cowpeas, pumpkin leaves, spindle pod and cleome menophylla sp. The notion that consumption of a large variety of indigenous vegetables is associated with poverty was very apparent. A list of the indigenous vegetables consumed is given below.

Shona name	**English name**	**Botanic name**
Bwowa	Mushroom	Agaricus villaticus
Ruredzo	Boot protector plant	Dicerocaryum
Munyemba	Cowpeas	Zanguebarium
Muvisi	Water melon leaves	Vigna Unguiculata
Muboora	Pumpkin leaves	Citrullus Vulgaris
Mushamba		Curcubita pepo
Muuyu	Baobab leaves	Citrullus lunatus
Mowa	Pigweed	Adansonia digitata
Mubvoorabhodho	Amaranthus	Amaranthus caudatus
Nyevhe		Amaranthus hybridus
Mukake	Cucumber leaves	Cleome menophylla
Gusha	Vegetable jute	
Mhuvuyu	Black jack	Corchorus olitorius
Musungusungu	Black nightshade	Bidens pilosa
Mubhereko	Mulberry leaves	Solanum nigrum
Mudhongi	Upright starbur	Morus alba
Gusha	Vegetable jute	Acanthospermum hispidum
Mhuvuyu	Black jack	Corchorus olitorius
Mubvunzandadya	Fat-hen	Bidens pilosa
Goche	Wandering jew	Chenopodium album
Borevore	Borevore	Commelina benghalensis
Chitembe	Chitembe	
Dzvengetsvenge	Dzvengetsvenge	
Munhangavave	Munhangavave	
Renja	Renja	
Muchacha	Muchacha	
Ndagwididza	Ndagwididza	
Mujaya murefu	Mujaya murefu	
Mhonja	Mhonja	
Ndagwididza	Ndagwididza	

The general belief was that indigenous vegetables are of low nutritional value as compared to the exotic vegetables which are also more tasty. The majority of the women preferred garden vegetables to indigenous vegetables and the reasons they gave were that:-

(a) Most of the indigenous vegetables have got very small leaves, so it is quite labour intensive to collect and clean them.

(b) Most indigenous vegetables have got a bitter taste which can only be improved by adding peanut butter. Most people do not prefer them therefore because they do not have the peanut butter to add.

(c) Some of the indigenous vegetables have disappeared because of the lack of adequate rainfall and people can no longer easily identify the species.

A few argued that indigenous vegetables are more tasty, it is only that they are not cooked the way they are supposed to be cooked. Indigenous vegetables need to be cooked over a slow heat for an hour or even more, and they taste better with peanut butter rather than cooking oil. The problem nowadays is that women either lack the patience or do not have time, so they just have to prepare vegetables by the frying method, hence they complain of the bitter taste.

All agreed that indigenous vegetables taste best when consumed during the summer months because they are still fresh and tender. Later on the leaves become coarse, bitter and take long to cook. With the scarcity of firewood nowadays, people will turn to exotic vegetables which can be fried for a few minutes but it was noted that exotic vegetables are not popular in summer because they are infested with pests and diseases and the leaves are not as tender as in winter.

Perception of collector well community garden:

At Muzondidya the women welcome the garden as a source of vegetables and income. The complaint was that the beds are too few. Perceived problems include stealing, lack of market to sell produce and long queues during irrigations because pumping water into individual buckets causes delays. Others entertained the idea of irrigating in turns although some raised the fear of produce being stolen in their absence.

Women felt that gardening is their responsibility (as they are the providers of relish) so they should be fully involved in the garden. The women do not give up anything in order to find time to work in the garden, they just fit it into their schedule.

"The collector well is a blessing" was the chorus when women of Gokota were asked about perceptions of the well and garden. The reason is that it is the only source of clean drinking water for many surrounding villages. They viewed the garden as a reliable source of vegetables and income. Problems encountered in the garden so far are pests (cutworms and crickets), delay in planting caused by delay in provision of a suitable tractor from Jerera (although the tractor was booked in time) and the lack of a proper committee.
The women at Mawadze welcome the collector well and community garden because the collector well is the only source of clean drinking water for a wide radius and the garden is viewed as a reliable source of vegetables as well as income. Non-members will also have access to fresh vegetables from the garden. As far as working in the garden is concerned, the women said that they are prepared to sleep in there if need be. Problems expected to be encountered in the garden are pests, the possibility of lack of market if there is overproduction of vegetables, and fear of thieves. The women said that they need help to establish reliable markets because there are other gardens around which are capable of producing vegetables.

At Nemauku, gardening has not yet started, but the women welcome the garden as a source of vegetables and income. Some of the problems anticipated include pests, thieves, lack of gardening tools and unavailability of manure because of lack of animals. The women said that they could go up into the hills to collect leaf litter but are afraid of snakes. The women felt that gardening is their responsibility so they should be fully involved in the garden. When asked whether women alone can manage the project, the minority were confident that it could be done while the majority felt that men should be involved. A heated discussion ensued on this issue and some women pointed out that the all-women committee was inefficient. The committee members argued that it appeared so because other members of the garden left it to the committee to carry out all tasks when in fact they could have come in and offered to do the job when they realised that the committee members were committed elsewhere. They also pointed out that the project cannot succeed because of lack of cooperation amongst members which they attributed to lack of respect for the other's capabilities and jealousies.

At Dekeza an existing cooperative garden could not accommodate all willing persons, therefore those not in this have been accommodated in the collector well garden. The women feel that working in the garden will reduce idleness in the community and the vegetables produced will improve nutrition as well as household incomes. The women perceived no problems with the well and garden. They have nine pump minders, four of whom are women, and they are confident that they will manage.

At Matedze, well digging is still in progress but the women are already relieved that a reliable source of water is to be close at hand. They used to get water from the river by digging into the sand and people used to wake up at 2.00 am in order to get to the river before the others. The other major anticipated benefit from the scheme was said to be an extra source of relish with income a secondary bonus. They also believe that nutrition will improve. It was also suggested that problems of theft may arise and the solution was to leave the well outside the garden when fencing.

Agritex Services

The women said that they are farmers in their own right, attend meetings regularly and consult the Agritex extension worker whenever the need arises. A significant number of the women said that they are keen master farmers who benefit a lot from extension. Overall, the Agritex services were said to be excellent except at Nemauku where the women said the extension worker is not yet giving advice because there is nothing growing. They hope to interact more with him when the garden becomes operational. At Muzondidya the women said that they only have themselves to blame if not benefitting much from extension because some hardly attend any meetings at all, leaving it all to the master farmers to benefit. At Matedze where well construction is still in progress, the women said that they interact a lot with the extension worker and hope to consult more with him when the garden becomes operational. The extension worker was said to be the most important person for the technical success of the scheme because of his knowledge which he can pass on to the scheme members.

CONCLUSIONS

Site 1 Muzondidya

The impression given was that the women are not meeting and working together to improve their livelihood in the community. They have the knowledge on how to enhance development in their community but lack the initiative. Lack of commitment and individualism seem to be the limiting factors.

Site 2 Gokota

Women of this community are prepared to do something to improve their livelihood. Although there are no income generating projects at the moment, plans are in the pipeline to start poultry and pottery projects. The only setback that the women foresee is cash and lack of market for their wares.

Site 3 Dekeza

Women of this community need a gentle push to get things moving. They impressed me as women determined to co-operate and produce results. It appears that their garden project will be a definite success and that other projects are going to emanate from income generated by it.

Site 4 Nemauku

The impression given was that the women are not putting enough effort to bring about change in the community. This is because they lack both initiative and commitment. Each woman is doing her own thing and expecting somebody else in authority, in particular the VCW, to decide what could be done for them. During our discussions it became clear that several women are talented in dressmaking, crocheting etc, so the women could benefit by forming a women's group where they could engage in various activities such as sewing, cooking, handcrafts, childcare, nutrition, netball, singing etc. Experiences here to date have indicated that having a garden committee comprised of women only is not necessarily a good thing. While the garden is being established, there appear to be teething problems that women alone cannot solve. In this particular case, some of the women on the committee were hampered by pregnancies whilst others left to be with their husbands in town, leaving nobody to carry out simple tasks. Other garden members sat back and waited for the committee members to act. No firm decisions were made and people broke the constitution rules at will without any repercussions. Had there been some men on the committee, I am sure (and the women agreed with me) that the situation would have been different. In future it would be worthwhile for people to choose a mixed committee with members who are permanently in the area rather than those who may migrate to towns during the course of the year.

Site 5 Mawadze

Women of this community impressed me as being hardworking people determined to improve their community. They are engaged in various income generating projects and seem to work together without problems. I have no doubt that their garden project will be a success.

Site 6 Gondora

Women of this area are engaging in various ways of earning income to cope with the rising cost of living. This they do as individuals, and what is left now is for them to meet together to decide what they can do together to make more money. They appeared to have the drive to improve their livelihood, and were pestering us for suggestions on what activities to engage in and how to start. We were promised that they are just waiting for the garden to start before we see wonders. I hope they keep up that spirit.

Main Findings

- In a group, there are leading persons who tend to decide everything for the group. Other group members either do not get much time to speak or are not willing to speak, they just have to follow their "leaders".

- A woman's place in the community is very well defined; she is there to look after her home, her family and her fields. More often than not, a woman is left to do most of the tasks while the man is out drinking.

- Women rarely support other women in leadership positions, the major reasons being jealousy, lack of unity, hatred, lack of education etc.

- Women have a lot of ideas but are too shy to speak in front of the men. On the other hand they feel frustrated and claim that they are not given a chance to air their views. It is difficult for women to reverse the subservient role and to take the initiative. The question appears to be: What can be done to help women feel confident enough to become decision-makers ?

- Men generally have a negative attitude towards the ability of women to make decisions, and prefer to prove that things do not work if managed by women. Any failed innovation by women attracts all the blame from men.

- A significant number of women seem to enjoy master farmers courses and receive good advice from Agritex. The majority though, do not seem to have direct contact with extension workers except at routine farmers meetings which they attend.

- Although most people prefer to consume cultivated vegetables rather than indigenous ones, the latter are consumed more because people cannot afford to buy cultivated vegetables all the time. The number of indigenous species has also dwindled because of the current rainfall patterns, so much so that during the drought people had to consume species hitherto shunned eg mubvoorabhodho, mhonja, nhanzva, chividco, mujaya murefu, and mudhongi. Some continue to consume indigenous vegetables even now however, claiming that they are just as good as the other species if prepared correctly.

Lists of Participants:

Muzondidya (Site 1)

1. Mrs I. Chilevani*
2. Mrs T. Chilevani
3. Mrs G. Masingwini
4. Mrs S. Chilevani
5. Mrs Chitore
6. Mrs S. Zishiri
7. Mrs E. Mufari*
8. Mrs J. Fambi
9. Mrs S. Mahoshe
10. Mrs A. Hlatywayo
11. Mrs T. Chigwili
12. Mrs Z. Magodo
13. Mrs J. Chitole
14. Mrs Makamba
15. Mrs Chivangani
16. Mrs D. Chauke*
17. Mrs J. Musikavanhu (VCW)
18. Mrs T. Chando
19. Mrs M. Chivangani
20. Mrs I. Masiyavito*
21. Mrs V. Semende

Gokota (Site 2)

* NB The list of participants as this site was not recorded. Fifty one women attended this meeting

Dekeza (Site 3)

1. Mrs A. Chirundo
2. Mrs L. Chibako
3. Mrs C. Revesai
4. Mrs N. Mahia
5. Mrs V. Manjeru
6. Mrs R. Pembera
7. Mrs D. Munetso
8. Mrs S. Svinga
9. Mrs F. Gondo
10. Mrs A. Tamai
11. Mrs E. Matsiani
12. Mrs G. Mushava
13. Mrs S. Makota
14. Mrs E. Mushava
15. Mrs T. Munjanja
16. Mrs M. Chitatari
17. Mrs E. Mupande
18. Mrs S. Chanduka
19. Mrs M. Mudzingwa
20. Mrs T. Makanani
21. Mrs S. Kilemenzi
22. Mrs M. Chibako
23. Mrs C. Manjeru
24. Mrs Z. Chasapo
25. Mrs M. Makwevera
26. Mrs L. Mataruse
27. Mrs K. Tambisai
28. Mrs T. Pavari
29. Mrs M. Bhasapo
30. Mrs N. Chirundo
31. Mrs L. Chitalo
32. Mrs J. Tamayi
33. Mrs E. Mushava
34. Mrs Mawere
35. Mrs E. Kimbini.

Nemauku (Site 4)

1. Mrs Pozingo
2. Mrs J. Muvavi
3. Mrs Makwindi
4. Mrs N. Dzingo
5. Mrs Makwidzi
6. Mrs Masocha
7. Mrs Chikwanda
8. Mrs Murimirwa
9. Mrs A. Mangezi
10. Mrs Bhaureni
11. Mrs Makwindi
12. Mrs Tinarwo
13. Mrs Muchimbusa
14. Mrs Chipato
15. Mrs Bhenjam
16. Mrs G. Nezvikonde
17. Mrs Tinarwo
18. Mrs Tinarwo
19. Mrs Tinarwo
20. Mrs Chapfidza
21. Mrs Makono
22. Mrs P. Mashiripita
23. Mrs M. Mashiripita
24. Mrs P. Poterai
25. Mrs A. Muvavi (VCW)
26. Miss Manatsa
27. Mrs O. Matimba

Mawadze (Site 5)

1. Mrs Mutakwa
2. Mrs Mucheni
3. Mrs A. Ndanga
4. Mrs Matimbira
5. Mrs G. Chipato
6. Mrs P. Chipato
7. Mrs M. Muchini
8. Mrs P. Mucheni
9. Mrs I. Majaura
10. Mrs C. Ndanga
11. Mrs Minho
12. Mrs C. Mawadze
13. Mrs Muroi
14. Mrs J. Zvanya
15. Mrs P. Zvenyika
16. Mrs Mauta
17. Mrs Chibanga
18. Mrs Mawadze
19. Mrs Taruvinga
20. Miss Mawadze
21. Mrs Gudo
22. Mrs Chikerema
23. Mrs L. Charuka
24. Mrs Mujeke
25. Mrs R. Banda
26. Mrs Makara
27. Mrs Mawadze
28. Mrs Ndanga
29. Mrs Mika
30. Mrs S. Chikerema
31. Mrs J. Charuka (ZANU PF District Level)

Matedze (Site 6)

1. Mrs L. Kwaramba
2. Mrs S. Manatsa
3. Mrs R. Guyo
4. Mrs E. Rynos
5. Mrs O. Chitambira
6. Mrs E. Hanyani
7. Mrs M. Samanjanji
8. Mrs N. White
9. Mrs E. Guyo
10. Mrs R. Mahiya
11. Mrs E. Makonese
12. Mrs A. Muchini
13. Mrs Mudzingwa
14. Mrs R. Tsvana
15. Mrs S. Guyo
16. Mrs M. Maoko
17. Mrs R. Mugore
18. Mrs T. Svuure
19. Mrs S. Guyo
20. Mrs P. Mutibwichi
21. Mrs S. Bomero
22. Mrs Chemasiku
23. Mrs J. Makonye
24. Mrs E. Mutibwichi
25. Mrs A. Chirambadare
26. Mrs E. Mbondo
27. Mrs E. Muchini
28. Mrs S. Chihlanguma
29. Mrs C. Munatsi
30. Mrs O. Manjeru
31. Mrs S. Benjamin
32. Mrs J. Tsvatsva
33. Mrs A. Svuure
34. Mrs M. Mushuku
35. Mrs S. Chikosi
36. Mrs R. Mushuku
37. Mrs T. Mulajikwa
38. Mrs S. Matengani
39. Mrs M. Solomoni
40. Mrs R. Magutorima
41. Mrs Mahanga
42. Mrs Samson
43. Mrs F. Chekero
44. Mrs S. Mudzingwa
45. Mrs Varairwai
46. Mrs J. Mushuku
47. Mrs M. Matengani

Appendix 5: Meetings with groups of men

NOTES ON INFORMAL MEETING WITH MEN OF MAWADZE

A meeting was held on 10/05/94 with nineteen men at Mawadze. The facilitators were Messrs G. Mtetwa[1] and T. Dube[2]. Topics discussed included gender issues, division of labour, health, general household budget, nutrition, vegetable consumption, and attitudes and perceptions of the collector well community garden. The meeting started at 08.45 am and ended at 12.00 noon.

Gender Issues

About 75% of the participants were of the opinion that the husband is the head of the family and he is responsible for all decisions within the family. The other participants voiced that both husband and wife have an equal role to play in decision making. The majority also agreed that the responsibility of giving advice to daughters and sons fell on mothers and fathers respectively.
Generally, within the community, men make the decisions and women implement them. Most men argued that women can never work alone without men because they easily disagree on petty issues. Others said that men are naturally oppressive and therefore do not want to give women the chance to prove that they are just as capable as they are. They went on to say that we are living in a changing world where women are fighting for, and should be granted equal rights.

After the sale of farm produce, men take responsibility of how to use the money. Only a few said that they sit down with their wives and list down priorities together. Half said that they do not want to give responsibility of money handling to their wives because they are not trustworthy and can privately send money to their parents without informing the husband. They went on to argue that the high lobola they pay for a wife entitles them to assume total responsibility and make women their subordinates. They also alleged that women cannot budget!

However, one elderly man asserted that men are self centred and this causes unnecessary quarrels or even divorces in some homes. He urged his fellowmen to change for the better.

If there are disagreements within a family, close family members come together and resolve the differences amicably. If that fails, then a person well respected by the family is consulted. In a community project, disagreements are solved by the committee members and if they fail, then the committee will invite the Agritex Extension Worker to solve the problem. Others went on to say that if all this fails, then the people will have to take the matter to the Kraalhead. If the problem is strictly related to the project, then the wrongdoer will be punished according to the project constitution.

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1 Research Technician, LVRS, Chiredzi

2 Agricultural Assistant, LVRs, Chiredzi

Division of Labour

The decision on what to plant and where is made by both husband and wife. Discussions on the work schedule for the following day are held during the night. However the men agreed that about 75% of all the farming tasks are carried out by the wife and children because men usually spend very little time in the fields before going beer drinking. Other tasks like collecting water, fuel, shopping etc can be done by both. However, child care is definitely a woman's job. Changing and washing diapers by men is not entertained, unless the woman is too ill to perform the task. This is because from childhood, boys are told by their elders that changing diapers is a woman's job, so if they opt to do that, they will be considered to be 'ruled' by the wife. One commented that if employed by a white man, this very same man will be found changing those diapers and it was argued that it is part of the job.

The rainfed tasks are normally carried out during the following periods:-

Ploughing	- October to December
Planting	- October to January
Weeding	- October to April
Harvesting	- April to June
Processing & Storing	- August to September

Processing is usually done in the months when there is plenty of wind to enhance winnowing of rapoko and sorghum. Most of the above operations are carried out either by the family alone or with the help of hired labour or by brewing beer and inviting other farmers to help and drink.

Health

The nearest clinic is Siyawareva which is some 10 km away. There is a male VCW (Mr Elasto Chidyiya) who was said to be very hardworking. The man makes frequent visits to the collector well garden and encourages them to keep the area clean. He also helps site toilets at homesteads and recommends people to be given cement by the Health and Environmental Technician. The VCW also reports cases of kwashiorkor, malaria etc to the clinic and also distributes anti-malaria tablets.

The following health problems were cited:-

(a) Some people have to walk for several kilometres to obtain a letter from the councillor which entitles them to free medication.
(b) The clinic is far away.
(c) There is a shortage of drugs and staff at the clinic.
(d) Some of the clinic personnel are hostile and impatient.
(e) There is no ambulance to transport seriously ill patients to St. Anthony's Msiso Hospital.

General Household Budget

The main items of expenditure in order of priority are food, education, agricultural inputs and clothing. The main sources of income are rainfed farming, brick moulding, carpentry, weaving and beer brewing co-operatives (ZADO). Before the drought, there were some poultry and piggery projects and the men were hopeful that they would re-start these soon.

There are no income generating projects for men alone because the men are not united, jealous of each other and self-centred ! An example of a male only co-operative was a beer shop established in 1992 at Mushungwa which flopped due to drunkardness and lack of unity among members as well as a lack of a constitution.

Vegetable Consumption

This topic was not discussed because the men alleged that this is the women's domain.

Perception of collector well community garden:

All agreed that the project is a solution to their water problem; water for both gardening and domestic use. They vowed to work hard for the success of their project and feel that success will only be achieved if all people work hard and abide by the constitution rules.
Potential problems cited were:-

(a) Fear that some people will tamper with the water meters since the well is outside the garden.

(b) Possibility of flooding the market with produce from elsewhere. The men said that if this happens they will tell their wives to dry vegetables.

Agritex Services

The men said that the extension services were okay, but that the area covered by the extension worker is far too big and they would be happy if a second one is assigned so as to cover the whole area more effectively.

CONCLUSION

Men want to take credit for decision making when in reality some of these decisions actually emanate from the women. It appears that men want to hide behind 'tradition' when they knowingly oppress their female counterparts. More often than not, men leave women to look after the home, family and fields while they go beer drinking.

List of participants

1. Mr G. Kutadzaushe
2. Mr M. Mawadze
3. Mr J. Mawadze
4. Mr M. Mucheki
5. Mr C. Ndanga
6. Mr Mufaro
7. Mr R. Chikerema
8. Mr K. Chikerema
9. Mr A. Chikerema
10. Mr A. Mutanda
11. Mr V. Makara
12. Mr W. Makoni
13. Mr M. Makwara
14. Mr S. Makeme
15. Mr I. Ndanga
16. Mr A. Mucheki
17. Mr V. Ndanga
18. Mr N. Ndanga
19. Mr J. Charingemhino

NOTES ON INFORMAL MEETING WITH MEN OF NEMAUKA

A meeting was held on 10/05/94 with seven men at Nemauka. The meeting started at 1.30 pm and ended at 3.00 pm.

Gender Issues

As at Mawadze, the same opinion was reiterated that the husband is the head of the family and is responsible for all decisions within the family . Some men however conceded that when a woman initially gives advice, the man may brush it aside but later you find him following that same advice as if the decision was his. One labelled this as lack of understanding on the man's part. After the sale of farm produce, men take responsibility of how to use the money because the women are considered not trustworthy.

Within the community, men make the decisions and women implement them. Asked why all the garden committee members were women, the men replied that it is because these women have understanding husbands who are giving them good advice. They alleged that these women cannot progress on their own because they are naturally impatient and easily fight with each other. However, when it comes to physical work, the women were said to be very good 'labour managers' who can work around the clock while men go beer drinking.

Division of Labour

Joint decisions are made by husband and wife but implementation becomes the responsibility of the wife and children. Where gardening is concerned, the men claimed to 'help' whenever necessary. They usually help with land preparation and repairing fences. The day to day tasks of fetching water, firewood and shopping are a woman's job although men sometimes help when the need arises. Rainfed tasks are normally carried out during the following periods:-

Ploughing	- November to January
Planting	- November to January. Dry planting of pearl and finger millet usually done in October.
Weeding	- November to February
Harvesting	- April to June
Processing & Storing	- August to September

The whole family is usually involved in carrying out these tasks. Sometimes hired help is engaged.

Health

Nemauka clinic is about three km away and the men are happy about the services rendered by the clinic staff. If one goes to the clinic and is seriously ill, he is easily transferred to Ndanga Rural Hospital because the ambulance services are excellent. To ease the problem of people having to travel far to obtain letters for free medication, the WARD Councillor has authorised all the VIDCO chairmen to give such letters. The VCW (Mrs Dzingo) is a hard worker. Amongst her jobs, she monitors the children's supplementary feeding scheme and encourages people to build toilets and keep their homes clean to prevent diseases like dysentery and cholera.

General Household Budget

The main items of expenditure in terms of priority are farming implements and inputs, food, education, clothing, household items, fuel and health.

The main sources of income are agricultural produce, brick moulding, carpentry and weaving. There are no income generating projects for men alone because the men alleged that whenever donors come to their area, they have specifically asked for women to be given a chance to participate. Before the drought there was a poultry project.

Perception of collector well community garden

All agreed that the project will be a success as long as men are backing the women. No problems were envisaged as far as security and purchasing of inputs were concerned, nor will there be problems with marketing because there are four schools, a clinic and a business centre nearby.

Agritex Services

The extension services were said to be okay, although the work is being disturbed by the changed rainfall pattern.

List of participants

1. Mr Manasa
2. Mr Makwindi
3. Mr Gonese
4. Mr Weshiri
5. Mr Dzingo
6. Mr Mashanyare
7. Mr Chinounye

Appendix 6: Capital costs for a hypothetical programme of 250 schemes

Assumptions

A Government department or NGO contracts a commercial company to put in the collector well or borehole.

The Commercial company charges the Govt/NGO the full cost to cover the commercial rate of interest (25%; which it uses to write off its equipment) and includes a profit margin (25%).

Govt/NGO writes of its investment (ie the collector well or borehole) at the economic/social rate of interest (13%). This is the yardstick set by Government through the Agricultural Finance Corporation (AFC) for appraising projects aimed at benefiting the small-holder farming sector.

The aim is to put in 25 collector wells per year for 10 years. For this, 5 sets of digging equipment will be required (see 1 below); each set will simultaneously dig 5 wells per year. One set of drilling equipment is required (see 2 below). * = imported goods (£1 = Z$13 rate assumed).

Capital costs are for establishment of collector wells using a local concrete well lining material and include comparison with boreholes drilled under this semi-commercial approach.

Part A **Estimated costs of establishment per collector well**

	$Z inc tax	Life years	R&M %	Annual cost ACC	Annual cost R&M	Avge cost Z$/well
1. Digging equipment						
Small compressor	97300	10	2.5	27247	2433	5936
De watering equipment:						
Diaphragm pump	16250	10	50	4551	8125	2535
Air line	1200	2	0	833	0	167
Hose (3" by 40 metres)	2160	2	0	1500	0	300
Jack hammer	10000	10	5	2800	500	660
Air line	1200	2	0	833	0	167
Points (3 per well)	600					600
Manual winch	1200	10	0	336	0	67
Cable	700	1	0	875	0	175
Kibble	600	10	0	168	0	34
Gantry	4524	10	0	1267	0	253
Oil drums (4)	200	2	0	139	0	28
Tent	3000	5	5	1116	150	253
Steel shed	3575	10	0	1001	0	200

Gum boots (6 pairs)	410	1	0	513	0	103
Goggles 2 pairs)	50	1	0	63	0	13
Hard hats (2)	50	1	0	63	0	13
Gloves (5 pairs)	95	1	0	119	0	24
Pick axes (3)	160	1	0	200	0	40
Shovels (3)	250	1	0	313	0	63
Wheelbarrow	400	2	0	278	0	56
Sub-total digging equipment					11684	

				Annual cost		Avge cost
	$Z inc tax	Life years	R&M %	ACC	R&M	Z$/well
2. Drilling equipment						
Drilling rig & lorry*	1300000	10	5	364044	65000	17162
Landrover (5)	1150000	10	5	322039	57500	15182
Trailer & Bowser	40000	10	5	11201	200	528
Sub-total digging equipment					32871	

	$Z/month	
3. Staff		
Agricultural Extension officer	3000	1440
Community Development Worker	4000	1440
Driller	3000	1920
Pump Test Engineer	3000	1440
Scientist/Monitoring	3000	1440
Mechanic	3000	1440
Assist Driller/Crane Operator	1200	2880
Foreman (5)		
Sub-total staff		13440

	Z$/litre	Litres	
Diesel fuel	2.02	3000	6060
	Z$		
Hand pumps (2) & headwork	7000		7000
Brick work	1000		1000
Crushed stone	1800		1800
	Z$ metre	Metres	
Lining (concrete)	990	15	14850
Sub-total other costs			30710
GRAND TOTAL (non-profit making)			88705
Company profit (%)	25		22176
TOTAL COST (profit making company)			110882

ASSUMPTIONS

Commercial Discount factors (25%): No years:

Commerical Discount factors (25%): No years:	
1	
2	0.8
3	1.44
4	1.952
5	2.362
6	2.689
7	2.951
8	3.161
9	3.329
10	3.463
	3.571
Economic/social discount factors (13%)	
10	5.426
Number of wells dug/team/year	5
Number of wells drilled/year	25

Part B. Borehole costs by commercial driller (55m hole)

1. Using handpump

	(Z$)
Average total cost	31000
Success rate (%)	51 ie borehole giving 0.3 l/s
Real cost per success	60784

2. Using motorised pump

Borehole cost less handpump	28000
Success rate (%)	35 ie borehole givign 0.6 l/s
Real cost per success	80000
Cost of motor pump	28000
Total cost per borehole	10800

Part C. Comparisons of yields and costs

Pumping rates (li/sec):		
Collector well (handpump)	0.30	
Borehole (handpump)	0.30	
Borehole (motor pump)	0.60	
Pumping hours per day	7	
Handpumps per collector	2	
Handpumps per borehole	1	
Maximum yields (li/day):	m^3 per year	
Collector well	15120	5518.8
Borehole (handpump)	7560	2759.4
Borehole (motor pump)	15120	5518.8

Annual Capital Charge (Z$ per year):

Collector Well	20435	10 years at 13%
Borehole (handpump)	11202	10 years at 13%
Borehole (motor pump)	19904	10 years at 13%

Average Capital cost per cu m water:

Collector Well	3.70	
Borehole (handpump)	4.06	
Borehole (motor pump)	3.61	Plus operating costs

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